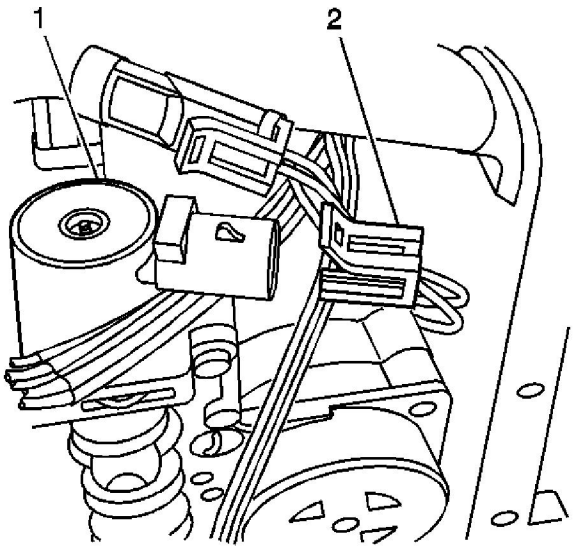
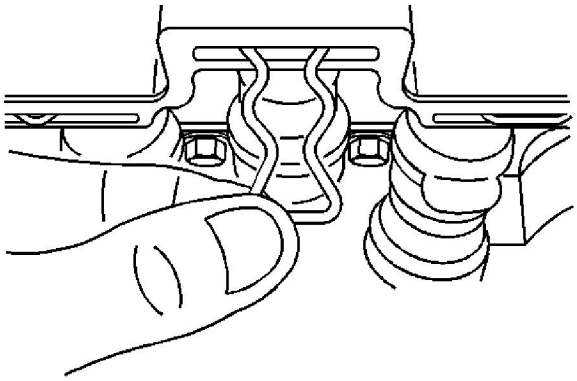
1-2 Shift Solenoid Valve Replacement

Removal Procedure

1. Remove the transmission fluid pan. Refer to Automatic Transmission Fluid and Filter Replacement.

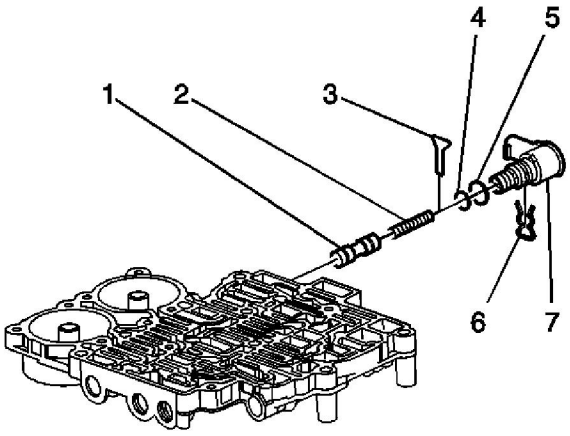


2. Disconnect the electrical connector (2) from the 1-2 shift solenoid (1).



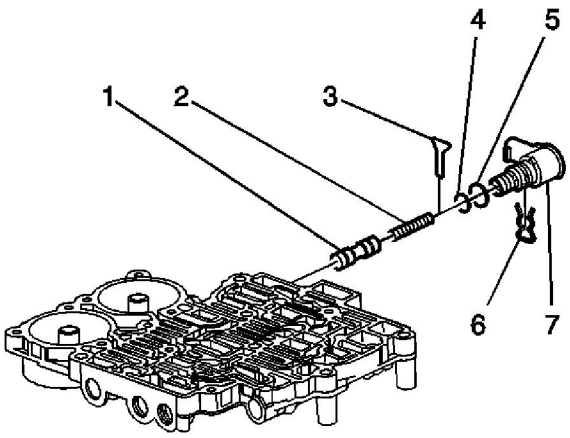
3. Using a suitable tool, remove the 1-2 shift solenoid retainer from the control valve body.

© 2010 General Motors Corporation. All rights reserved.

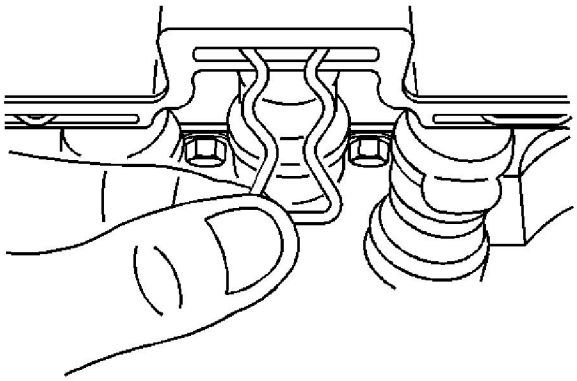


4. Remove the 1-2 shift solenoid (7) from the control valve body.
5. Remove the O-ring seals (4-5) from the 1-2 shift solenoid (7) ONLY if the O-rings are cut or worn.

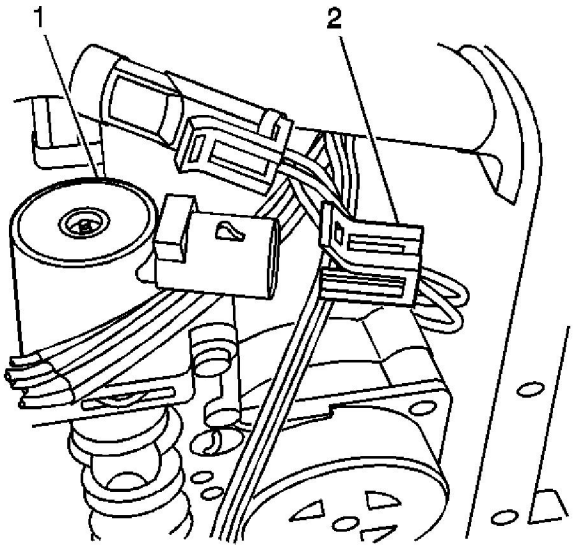
Installation Procedure



1. Install new O-ring seals (4-5) to the 1-2 shift solenoid (7), if the O-rings were previously removed.
2. Install the 1-2 shift solenoid (7) into the control valve body.



3. Install the 1-2 shift solenoid retainer into the control valve body.



4. Connect the electrical wiring harness connector (2) to the 1-2 shift solenoid (1).
5. Install the transmission fluid pan. Refer to Automatic Transmission Fluid and Filter Replacement.

Important: It is recommended that transmission adaptive pressure (TAP) information be reset.

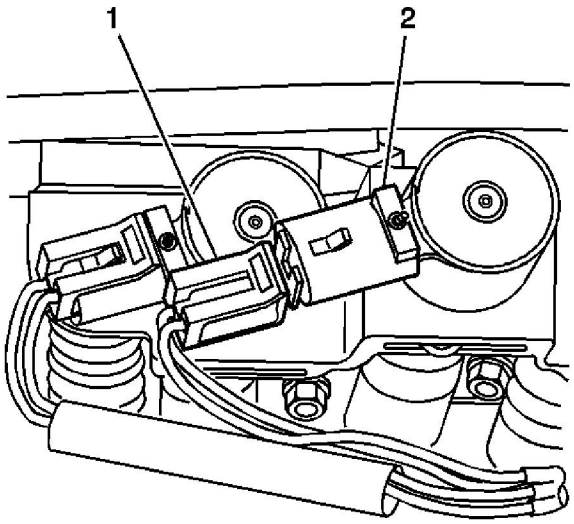
Resetting the TAP values using a scan tool will erase all learned values in all cells. As a result, The ECM or TCM will need to relearn TAP values. Transmission performance may be affected as new TAP values are learned.

6. Reset the TAP values. Refer to Transmission Adaptive Functions.

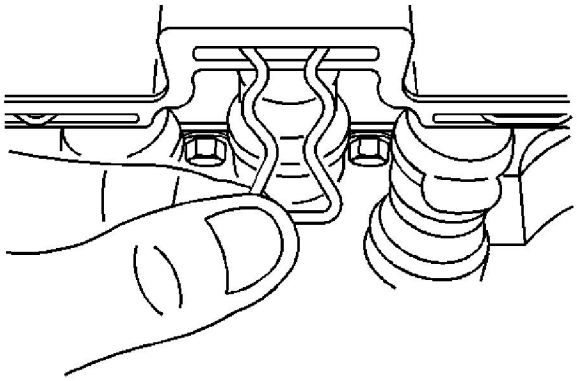
2-3 Shift Solenoid Valve Replacement

Removal Procedure

1. Remove the transmission fluid pan. Refer to Automatic Transmission Fluid and Filter Replacement.

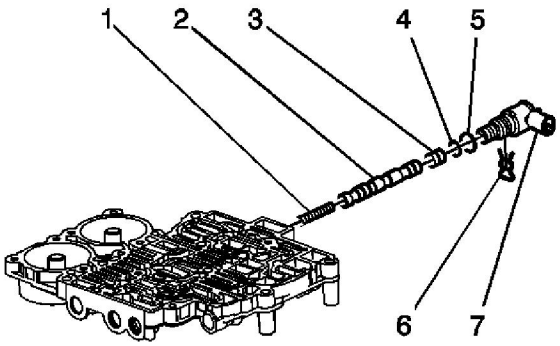


2. Disconnect the electrical connector (1) from the 2-3 shift solenoid (2).



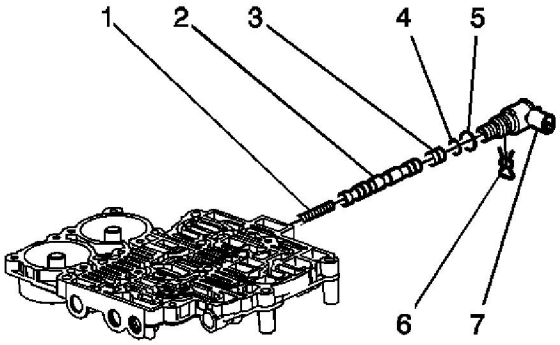
3. Using a suitable tool, remove the 2-3 shift solenoid retainer from the control valve body.

© 2010 General Motors Corporation. All rights reserved.

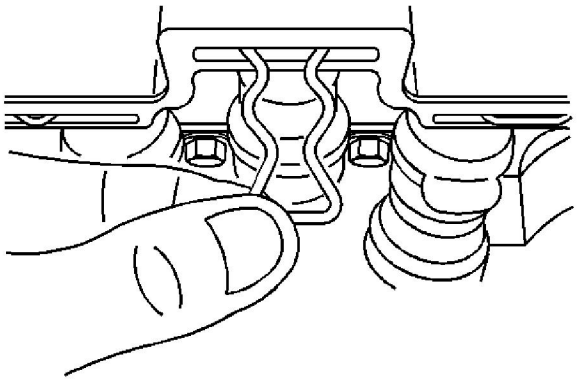


4. Remove the 2-3 shift solenoid (7) from the control valve body.
5. Remove the O-ring seals (4-5) from the 2-3 shift solenoid (7) ONLY if the O-rings are cut or worn.

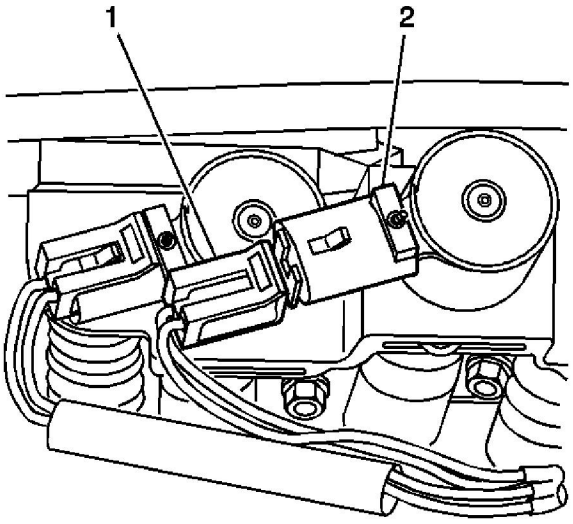
Installation Procedure



1. Install new O-ring seals (4-5) to the 2-3 shift solenoid (7), if the O-rings were previously removed.
2. Install the 2-3 shift solenoid (7) into the control valve body.



3. Install the 2-3 shift solenoid retainer into the control valve body.



4. Connect the electrical connector (1) to the 2-3 shift solenoid (2).
5. Install the transmission fluid pan. Refer to Automatic Transmission Fluid and Filter Replacement.

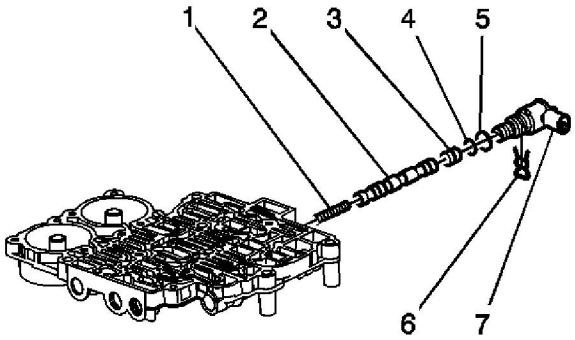
Important: It is recommended that transmission adaptive pressure (TAP) information be reset.

Resetting the TAP values using a scan tool will erase all learned values in all cells. As a result, The ECM or TCM will need to relearn TAP values. Transmission performance may be affected as new TAP values are learned.

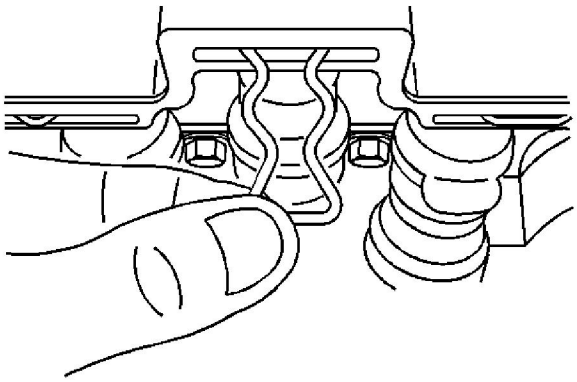
6. Reset the TAP values. Refer to Transmission Adaptive Functions.

4-5 Shift Solenoid Valve Replacement

Installation Procedure

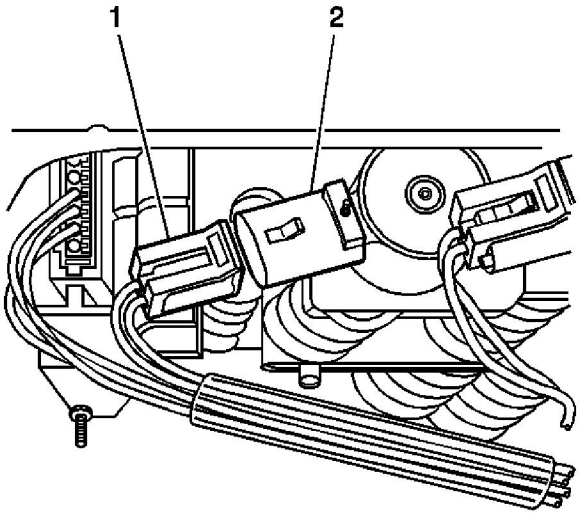


1. Install new O-ring seals (4-5) to the 4-5 shift solenoid (7), if the O-rings were previously removed.
2. Install the 4-5 shift solenoid (7) into the control valve body.



3. Install the 4-5 shift solenoid retainer into the control valve body.

© 2010 General Motors Corporation. All rights reserved.



4. Connect the electrical connector (1) to the 4-5 shift solenoid (2).
5. Install the transmission fluid pan. Refer to Automatic Transmission Fluid and Filter Replacement.

Important: It is recommended that transmission adaptive pressure (TAP) information be reset.

Resetting the TAP values using a scan tool will erase all learned values in all cells. As a result, The ECM or TCM will need to relearn TAP values. Transmission performance may be affected as new TAP values are learned.

6. Reset the TAP values. Refer to Transmission Adaptive Functions.

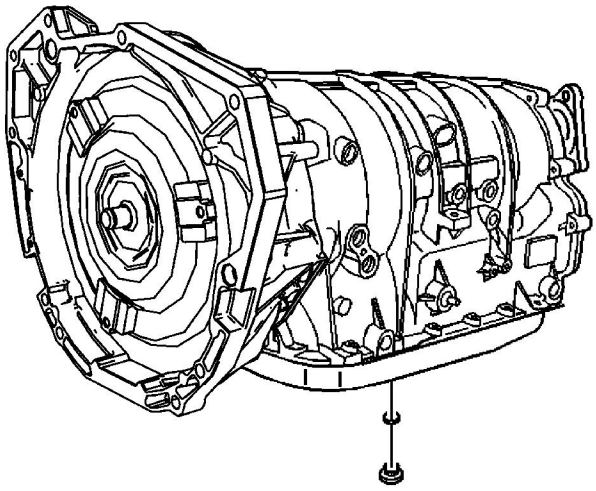
Automatic Transmission Fluid and Filter Replacement

Special Tools

- J 6125-1B Slide Hammer Adapter
- J 23129 Universal Seal Remover

Removal Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.
2. Place a suitable drain pan under the transmission fluid drain plug.

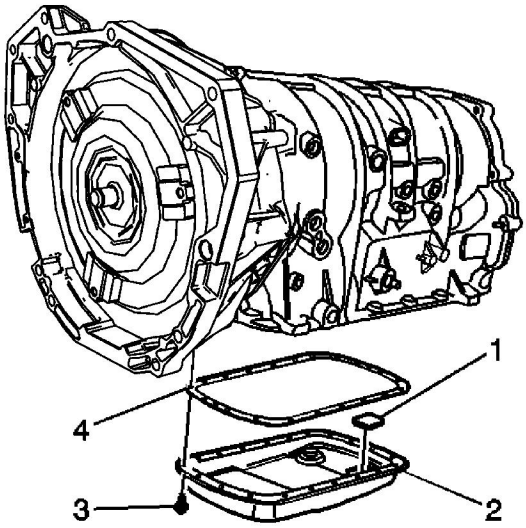


3. Remove and discard the transmission fluid drain plug.
4. Allow the transmission fluid to drain.
5. Inspect the transmission fluid for discoloration and contamination while draining.

   Caution: Refer to Component Fastener Tightening Caution in the Preface section.

6. After the transmission fluid has finished draining, install a NEW transmission fluid drain plug and tighten to **20 N·m (15 lb. ft)**.

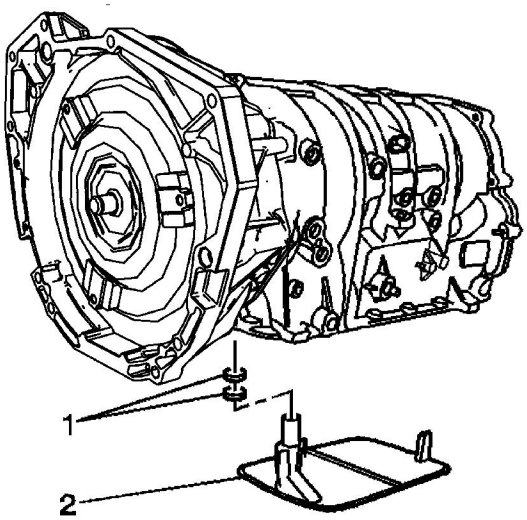
© 2010 General Motors Corporation. All rights reserved.



7. Remove the fluid pan retaining bolts (3).

Note: Lightly tap the fluid pan (2) with a rubber mallet if necessary in order to loosen.

8. Remove the fluid pan (2) and the gasket (4).
9. Clean and inspect the following for damage or wear:
   - Magnet (1)
   - Pan (2)
   - Bolts (3)
   - Gasket (4)

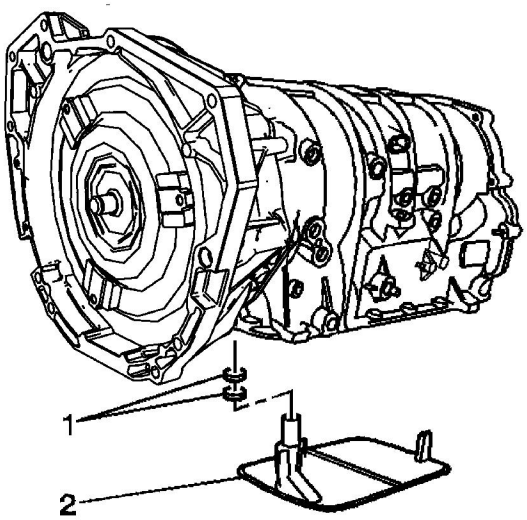


10. Remove the fluid filter (2). Use a suitable tool in order to pry the fluid filter neck out of the

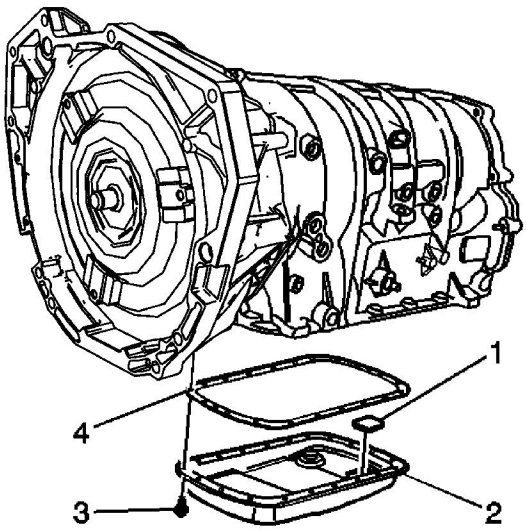
seals.

11. Remove the fluid filter seals (1) using J 23129 and J 6125-1B .

Installation Procedure



1. Install NEW fluid filter seals (1), onto the transmission fluid filter neck. Coat the new seals with a small amount of J 36850 or petroleum jelly before installation.
2. Install the transmission fluid filter (2) into the case.



Note: Fluid pan gaskets are reusable. Replace the gasket ONLY if the sealing surface is damaged.

3. Install the fluid pan (2) and the gasket (4) at the same time.

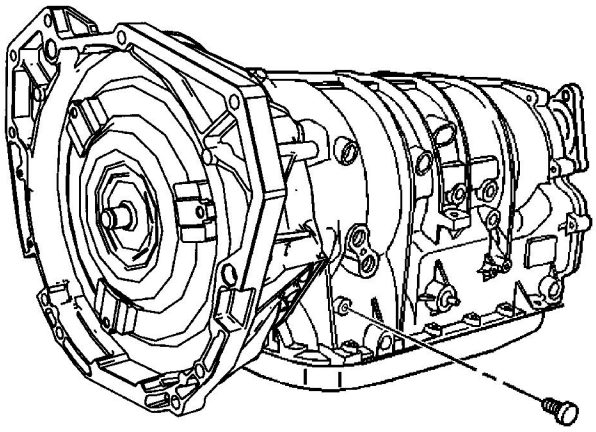
   Caution: Refer to Fastener Caution in the Preface section.

4. Install the fluid pan retaining bolts (3) and tighten to **11 N·m (97 lb. in)**.
5. Fill the transmission to the correct level. Refer to Transmission Fluid Check.
6. Inspect the oil pan gasket for leaks.
7. Lower the vehicle.

Automatic Transmission Fluid Pressure Test Hole Plug Replacement

Removal Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.

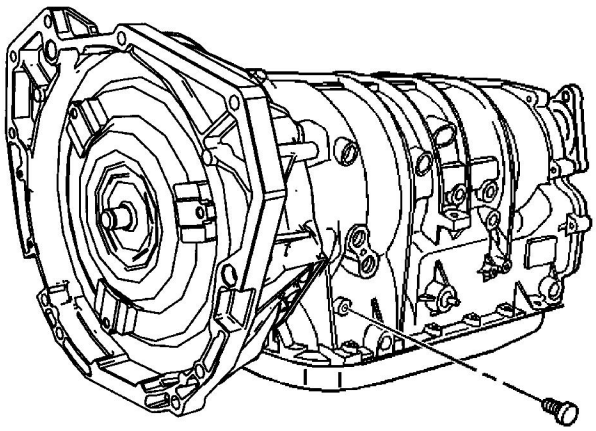


2. Remove and discard the oil pressure test plug.

Installation Procedure

Caution: Refer to Fastener Caution in the Preface section.

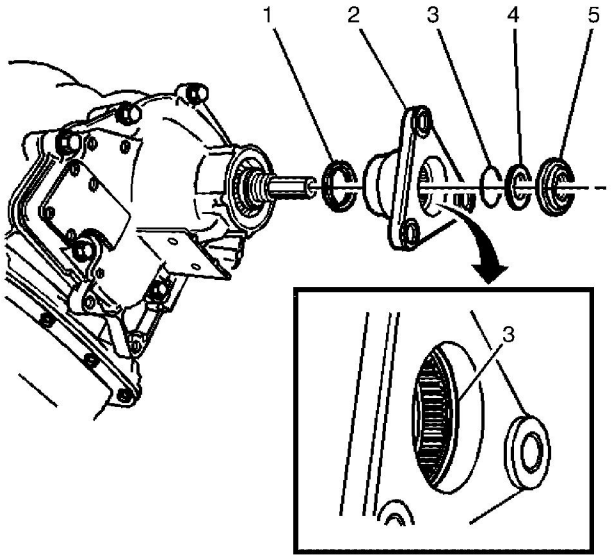
© 2010 General Motors Corporation. All rights reserved.



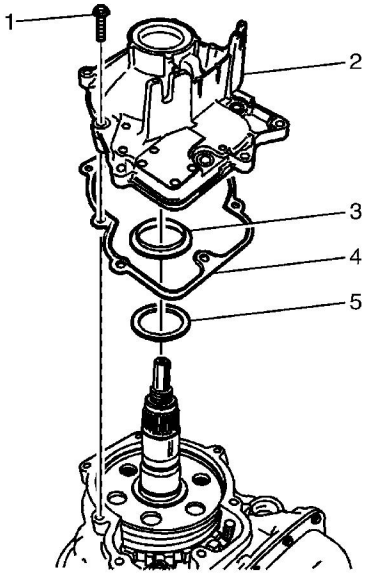
1. Install a NEW oil pressure test plug and tighten to **11 N·m (97 lb. in)**.
2. Check the transmission fluid level. Fill if necessary. Refer to Transmission Fluid Check.
3. Lower the vehicle.

Case Extension and Gasket Replacement

Removal Procedure



1. Remove the drive flange (2) and seal (3). Refer to Drive Flange and Seal Replacement.
2. Place a suitable jack under the transmission pan in order to support the transmission.
3. Remove the transmission support. Refer to Transmission Support Replacement.
4. Place a suitable drain pan under the extension housing.

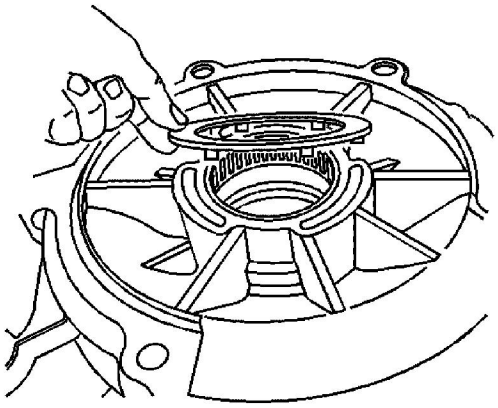


5. Remove the extension housing retaining bolts (1).

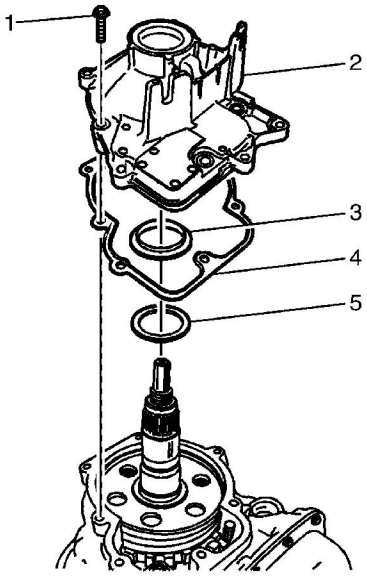
© 2010 General Motors Corporation. All rights reserved.

6. The output shaft retainer will slide off the output shaft while removing the case extension housing.
7. Remove the extension housing (2) and the seal (4).

Installation Procedure



1. Install the output shaft thrust washer to the inner side of the case extension housing prior to installing of the case extension housing. Align the thrust washer tabs with the locating slots on the case extension housing.

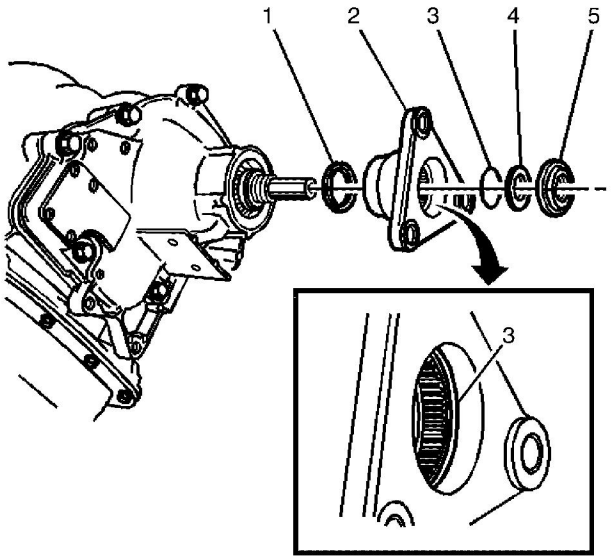


Note: The case extension housing gasket seal is reusable. Replace the gasket ONLY if the sealing surface is damaged.

2. Install the extension housing (2) and the seal (4).

Caution: Refer to Fastener Caution in the Preface section.

3. Install the extension housing bolts (1) and tighten to **22 N·m (16 lb ft)**.
4. Install the transmission support. Refer to Transmission Support Replacement.
5. Remove the transmission jack.

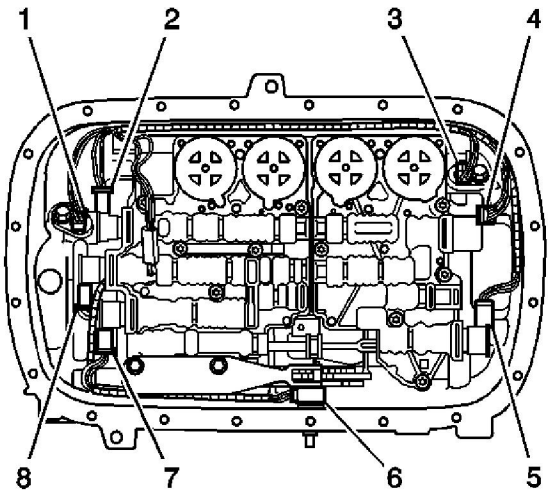


6. Install the drive flange (2) and seal (3). Refer to Drive Flange and Seal Replacement.

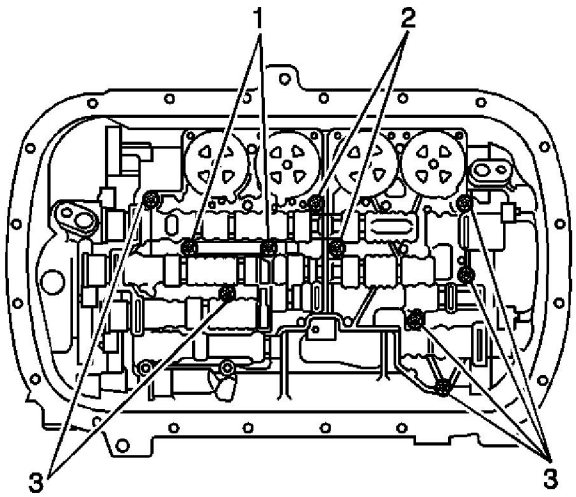
Control Valve Body Accumulator Assembly Replacement

Removal Procedure

1. Remove the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.

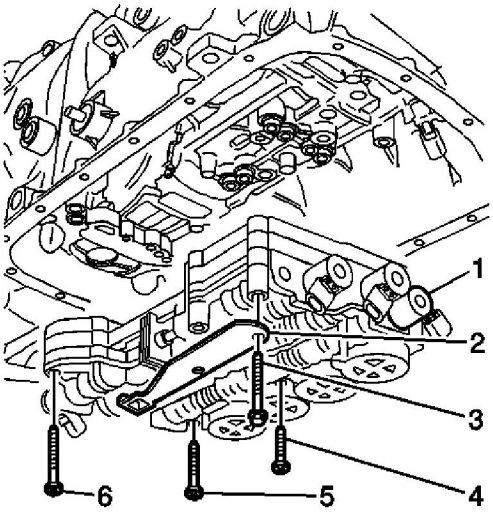


2. Disconnect the internal electrical connectors from all internal electrical components (1-8).

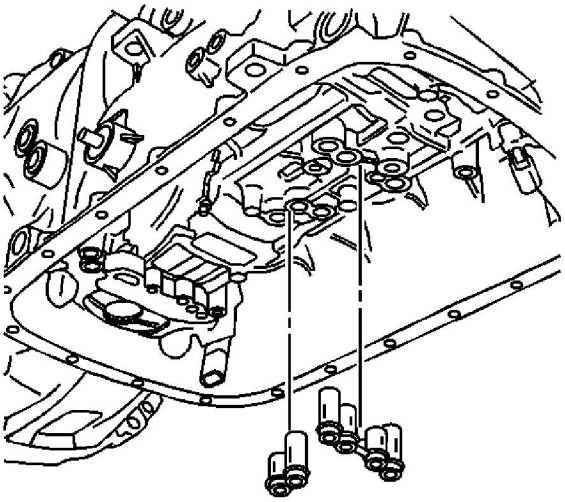


3. Remove ONLY bolts (1, 3) from the valve body assembly. Do NOT remove bolts (2) called out in the graphic.

© 2010 General Motors Corporation. All rights reserved.

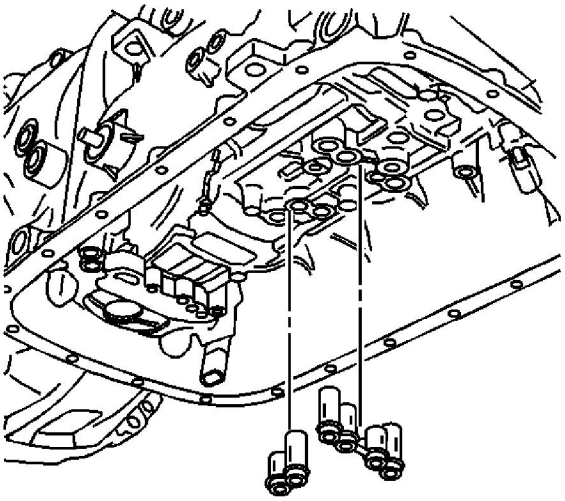


4. Remove the bolts (3-6) securing the control valve body accumulator assembly (1) and manual shaft detent assembly (2) to the transmission case.
5. Remove the manual shaft detent assembly (2) and control valve body accumulator assembly (1) from the transmission.

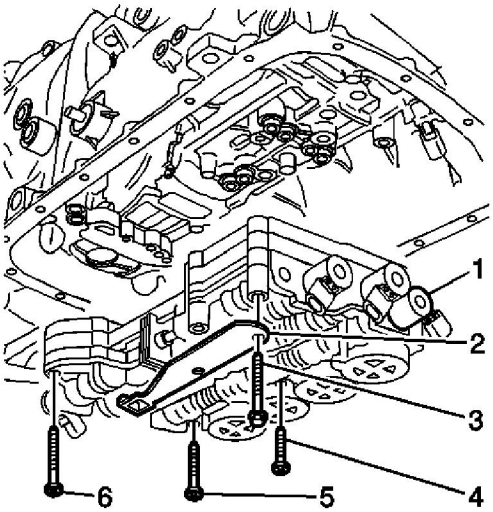


6. Remove the fluid passage sleeves only if replacement of the sleeves is necessary.

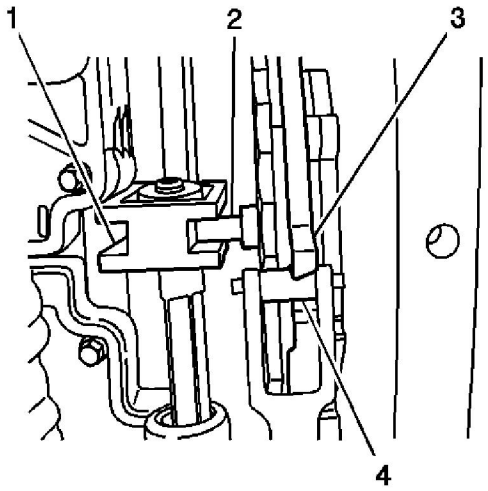
Installation Procedure



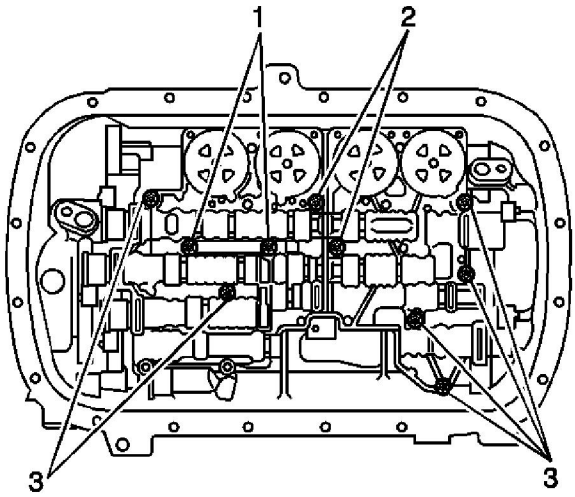
1. Install NEW fluid passage sleeves if previously removed.



2. Install the control valve body accumulator assembly (1) and manual shaft detent spring (2) to the transmission.
3. Install the manual shaft detent spring bolt (3) and hand tighten.



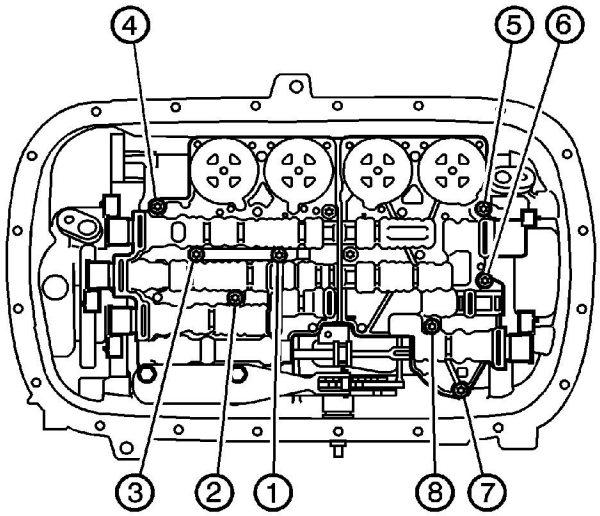
4. Make sure that the manual shift shaft detent lever locating pin (2) is properly engaged with the manual valve link (1).
5. Make sure that the detent spring roller (4) is properly engaged with the manual shift shaft switch (3).



Note: Do not tighten the bolts at this stage

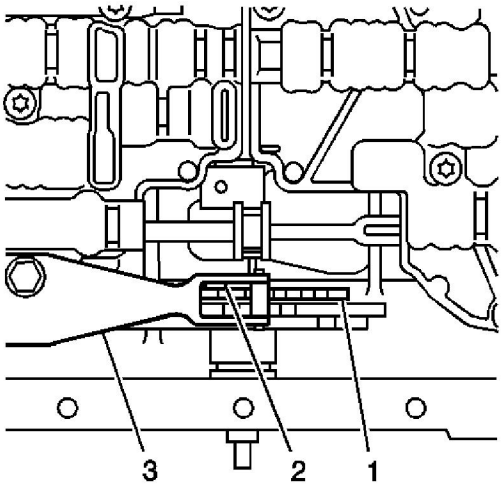
6. Install the control valve body accumulator assembly retaining bolts (1-3).

Caution: Refer to Fastener Caution in the Preface section.

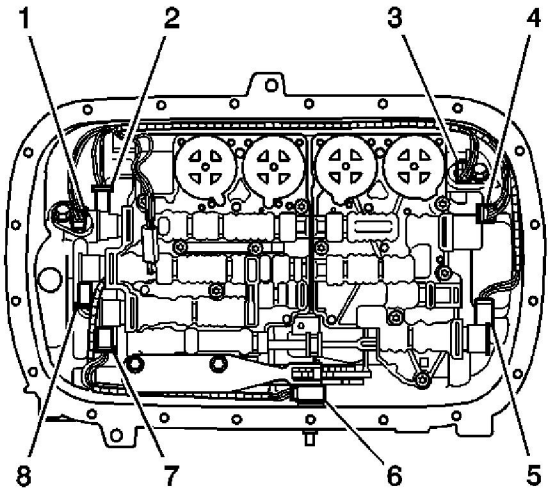


Note: If the bolts are tightened at random, valve bores may become distorted and inhibit correct valve operation.

7. Tighten the control valve body assembly bolts in sequence to **11 N·m (97 lb in)**.



8. Install a 0.8 mm spacer (2) between the manual shift shaft detent lever (1) and the manual shift shaft detent spring (3).
9. Tighten the detent spring bolts to **11 N·m (97 lb in)**.
10. Remove the spacer (2).



11. Connect the internal electrical connectors to all internal electrical components (1-8).
12. Install the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.

Note: It is recommended that transmission adaptive pressure (TAP) information be reset.

Resetting the TAP values using a scan tool will erase all learned values in all cells. As a result, the ECM or TCM will need to relearn TAP values. Transmission performance may be affected as new TAP values are learned.

13. Reset the TAP values. Refer to Transmission Adaptive Functions.

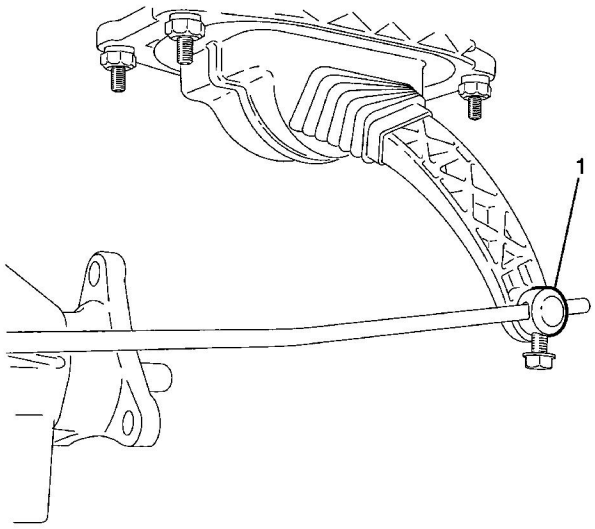
Drive Flange and Seal Replacement

Special Tools

- J 6125-1B Slide Hammer
- J 23129 Universal Seal Remover
- J 29873 Injector Nozzle Socket 30 mm
- J 44765 Seal Installer
- J 45012 Holding Fixture
- J 45019 Universal Puller

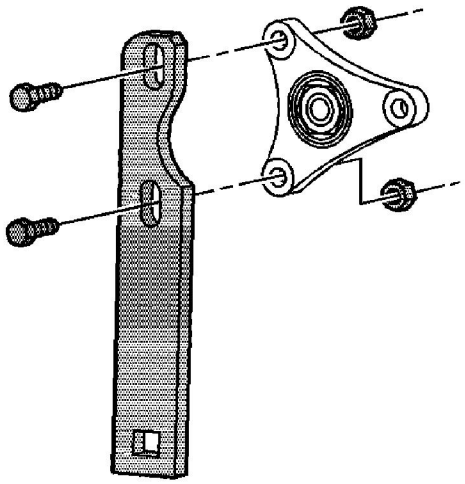
Removal Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.

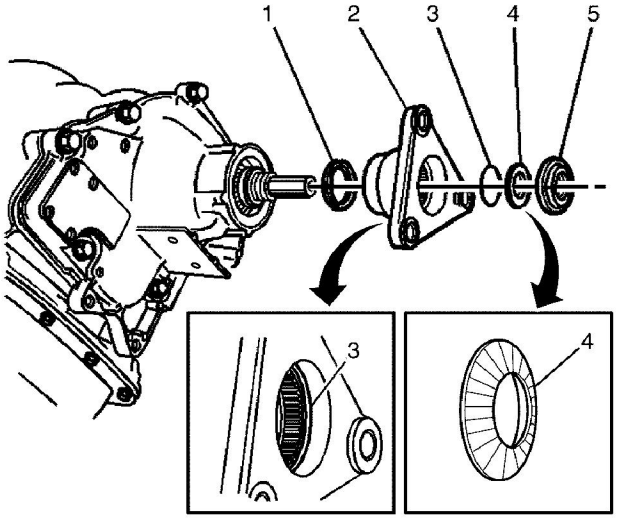


2. Remove the transmission manual shift shaft nut.
3. Disconnect the shift linkage from the transmission.
4. Place the transmission in neutral by rotating the transmission shift shaft clockwise 2 clicks.
5. Remove the exhaust system. Refer to Exhaust System Replacement.
6. Remove the propeller shaft coupler (1) from the transmission flange. Refer to Propeller Shaft Replacement.

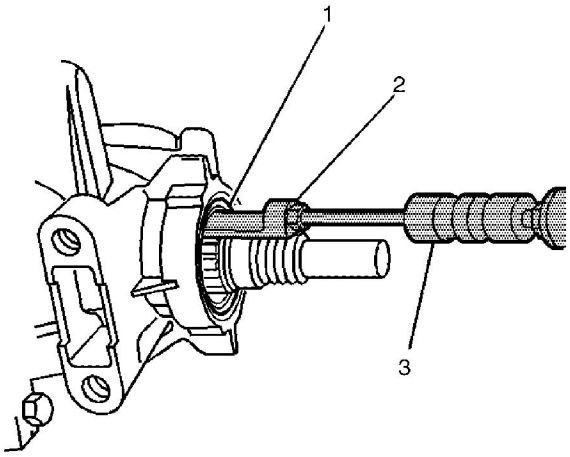
© 2010 General Motors Corporation. All rights reserved.



7. Install J 45012 to the drive flange.
8. While holding J 45012 loosen the drive flange nut using J 29873 .
9. Remove J 45012 from the drive flange.

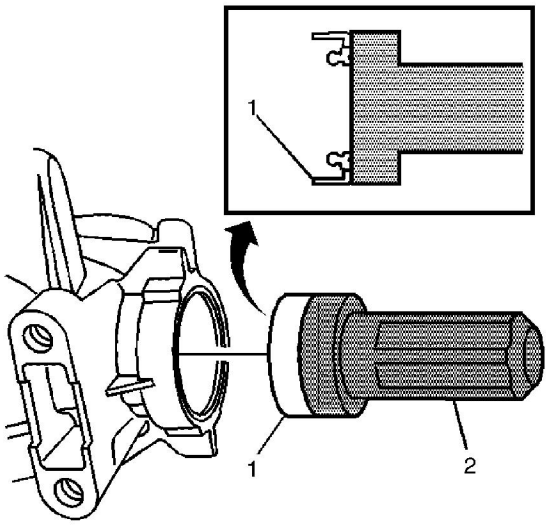


10. Remove the drive flange nut (5).
11. Remove the drive flange thrust washer (4).
12. Remove the drive flange (2) using J 45019 .
13. Remove the drive flange O-ring seal (3) from the drive flange.
14. Remove the output shaft assembly retainer (1).



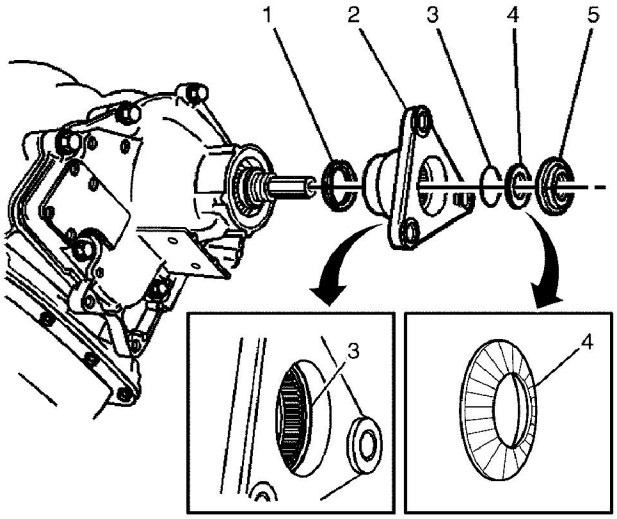
15. Use J 6125-1B and J 23129 (2, 3) to remove the transmission case extension seal (1).

Installation Procedure



Note: Install the seal onto the tool before installing into the case to prevent damage to the seal.

1. Using J 44765 (2), install the NEW transmission case extension seal (1).



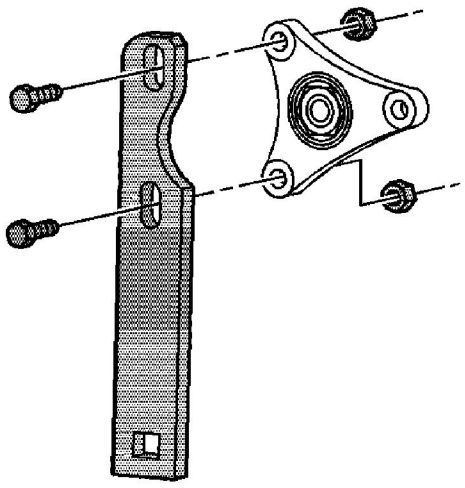
2. Install a NEW output shaft assembly retainer (1).

Note: Position the retainer on the end of the output shaft splines. The retainer will be pushed to the correct depth as the drive flange is installed onto the output shaft.

3. Install a NEW drive flange O-ring seal (3) into the drive flange (2).
4. Install the drive flange (2) to the transmission output shaft.

Note: Install the NEW drive flange thrust washer (4) as shown in diagram.

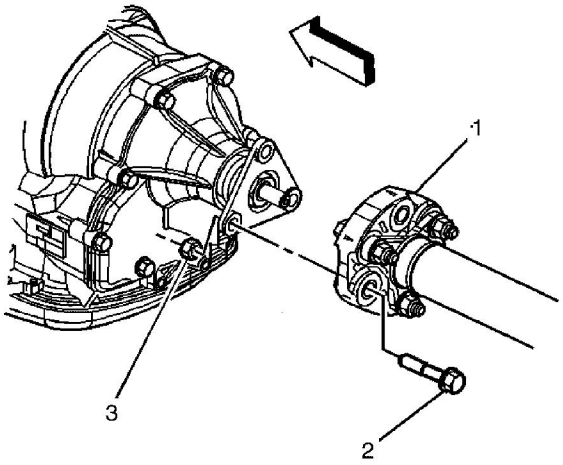
5. Install a NEW drive flange thrust washer (4).
6. Apply LOCTITE 272 to the NEW drive flange nut threads.
7. Start the NEW drive flange nut (5).



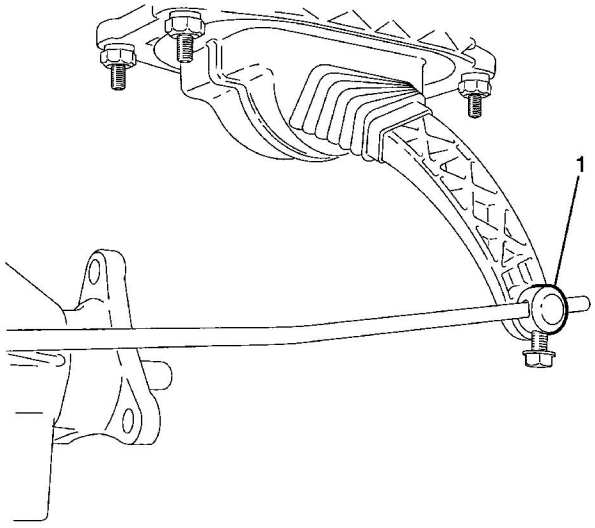
8. Install J 45012 to the drive flange.

Caution: Refer to Fastener Caution in the Preface section.

9. While holding J 45012 tighten the NEW drive flange nut using J 29873 to **60 N·m (44 lb ft)**.
10. Remove J 45012 from the drive flange.



11. Install the propeller shaft. Refer to Propeller Shaft Replacement.
12. Install the exhaust system. Refer to Exhaust System Replacement.



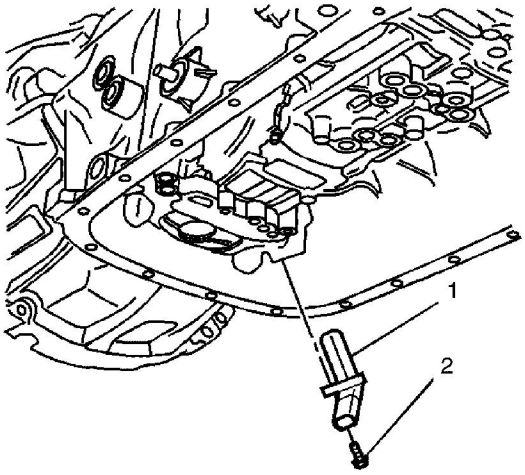
13. Place the transmission in the park position by rotating the selector lever shaft fully counterclockwise.
14. Connect the selector lever linkage to the transmission.
15. Install the transmission manual shift shaft nut and tighten to **9 N·m (80 lb in)**.
16. Check the transmission fluid level. Refer to Transmission Fluid Check.

17. Lower the vehicle.

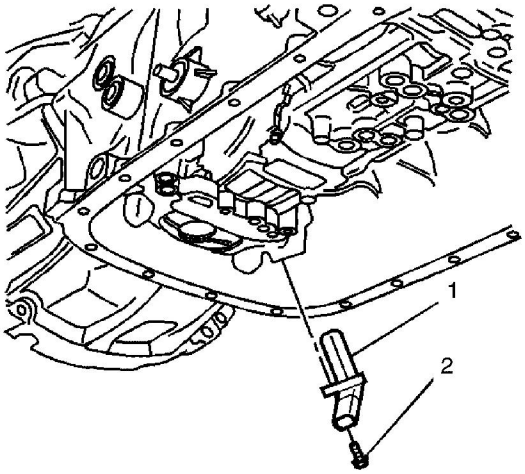
Input Speed Sensor Replacement

Removal Procedure

1. Remove the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.



2. Disconnect the electrical wiring harness connector (1) from the input speed sensor (2).
3. Remove the input speed sensor retaining bolt (3).

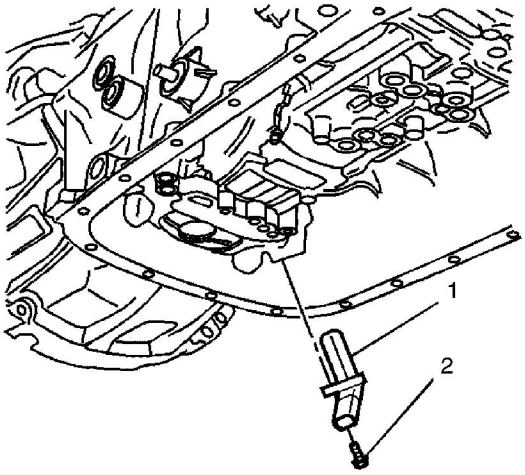


4. Remove the input speed sensor (1).
5. Inspect the input speed sensor (1) for the following conditions:

© 2010 General Motors Corporation. All rights reserved.

- Damaged or missing magnet
- Damaged housing
- Bent or missing electrical terminals
- Metal contamination stuck to magnet

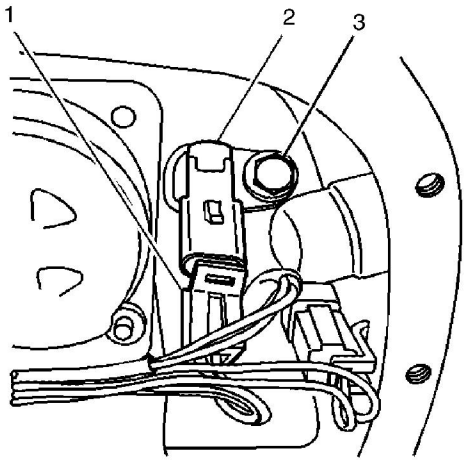
Installation Procedure



1. Install the input speed sensor (1).

   Caution: Refer to Fastener Caution in the Preface section.

2. Install the input speed sensor retaining bolt (2) and tighten to **11 N·m (97 lb in)**.



3. Connect the electrical connector (1) to the input speed sensor (2).
4. Install the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.

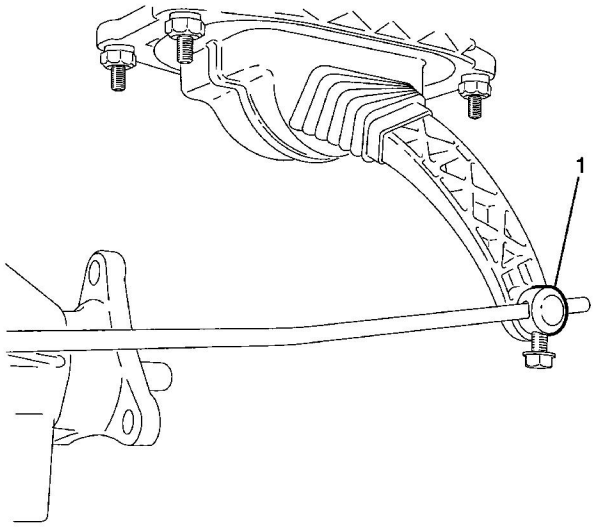
Manual Shift Shaft Position Switch Replacement

Special Tools

- J 44767 Seal Installer
- EN-48536 Frame Support Tool (Engine Lower 65 mm Kit)

Removal Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.

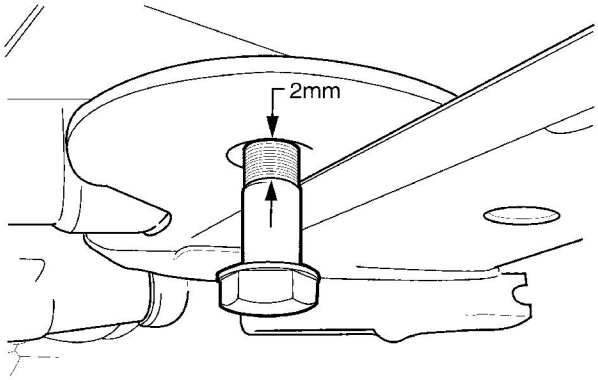


2. Remove the transmission manual shift shaft nut.
3. Disconnect the shift linkage from the transmission manual shift shaft.
4. Remove the exhaust system. Refer to Exhaust System Replacement.
5. Remove the propeller shaft. Refer to Propeller Shaft Replacement.

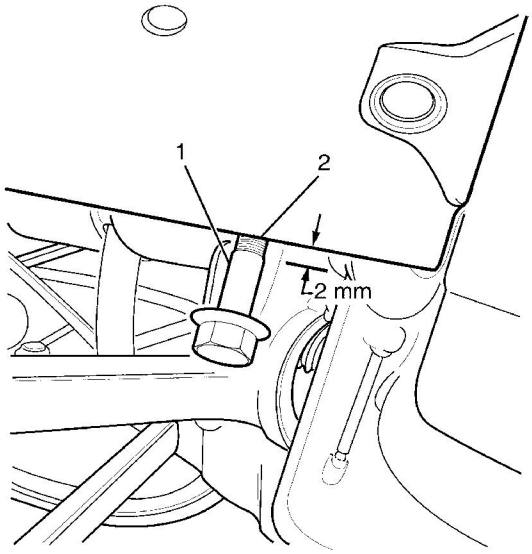
Note: The engine mounts must NOT bend or deflect from the vertical position, damage to the mount will occur.

6. Support the power train with a suitable jack or table.

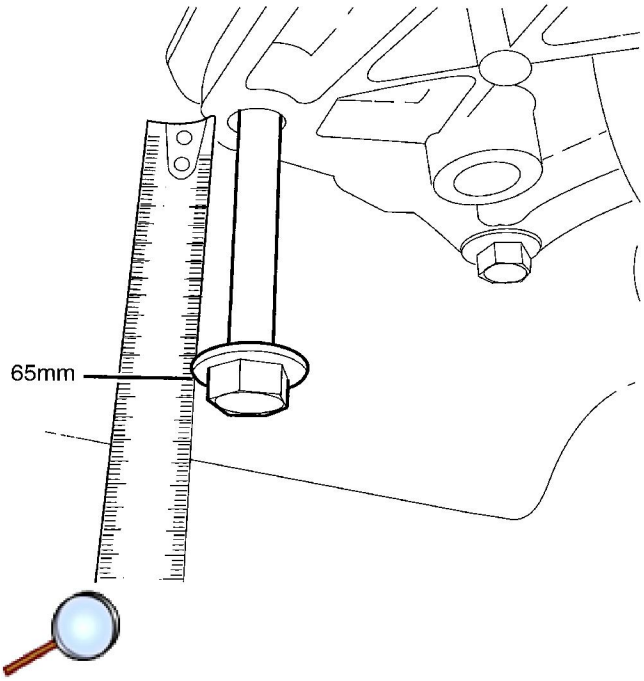
© 2010 General Motors Corporation. All rights reserved.



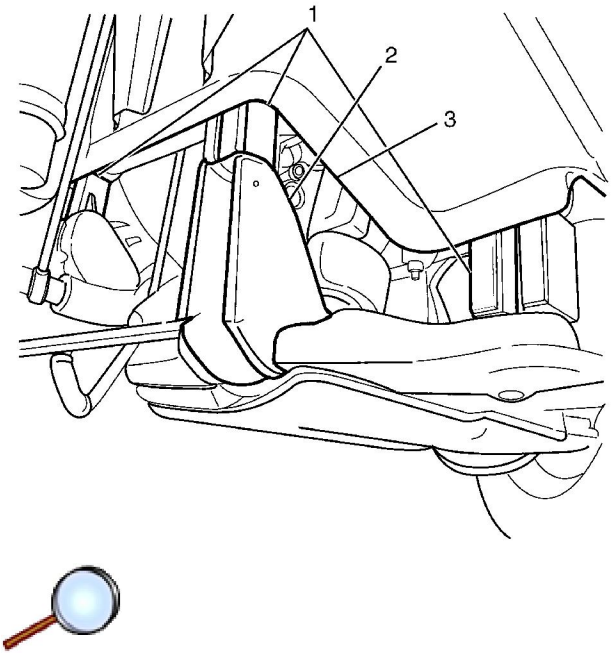
7. Replace the front sub-frame rear bolts and fit bolts from special tool kit. Refer to EN-48536 .
8. Install bolt till stepped shank (1) is 2 mm below sub-frame (2).



9. Replace the front sub-frame front bolts and fit bolts from special tool kit. Refer to EN-48536 .
10. Install bolt till stepped shank (1) is 2 mm below chassis rail flange (2).



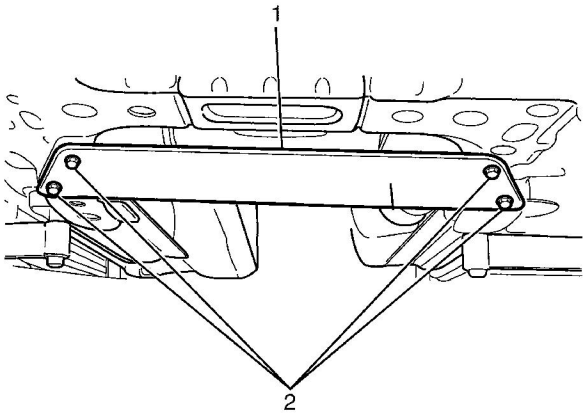
11. Remove all 4 transmission mount to body bolt and install 2 bolts from special tool kit in diagonal holes e.g left hand front and right hand rear.
12. Install until 65 mm is measured between bolt heads (1) and transmission mount (2).
13. Remove front sub-frame middle bolts.
14. Lower power train slowly until the sub-frame and transmission mount are resting on bolts.



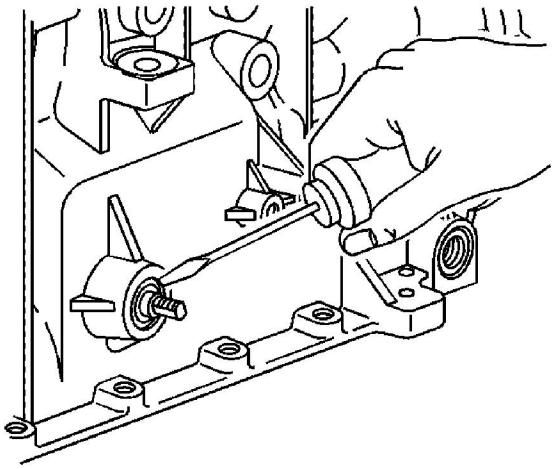
15. Insert 65 mm spacer blocks (1) between sub-frame (2) and chassi rails (3).

Caution: Refer to Fastener Caution in the Preface section.

16. Tension front sub-frame front and rear bolts and tighten to **95 N·m (70 lb ft)**.
17. Install and tension middle sub-frame bolts and tighten to **95 N·m (70 lb ft)**.
18. Remove supporting jack or table

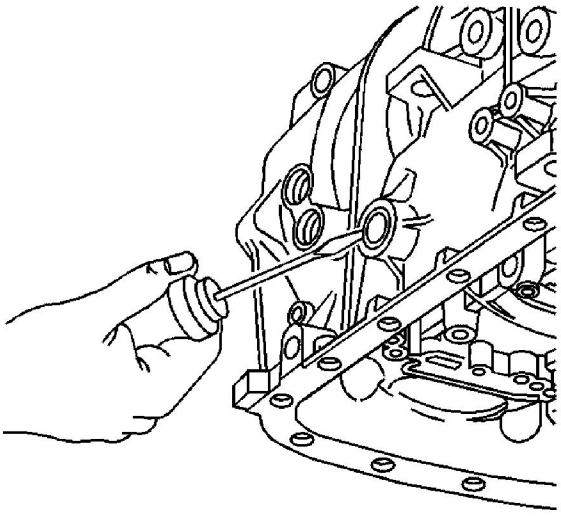


19. Install engine support plate (1) to front sub-frame (2).
20. Tension plate securing bolts (3) and tighten to **10 N·m (89 lb in)**.



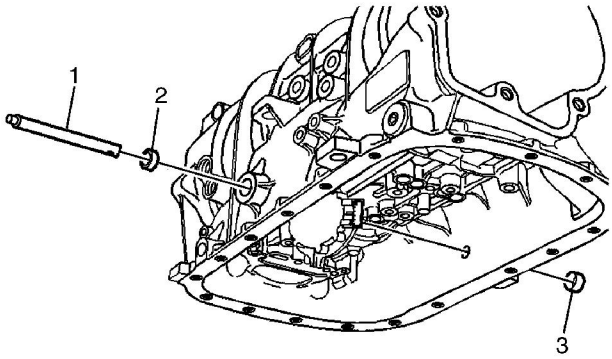
Note: Replace the shaft seal if damaged or worn.

21. Using a suitable tool, remove and discard the shaft seal.



Note: Replace the cup plug if damaged or worn.

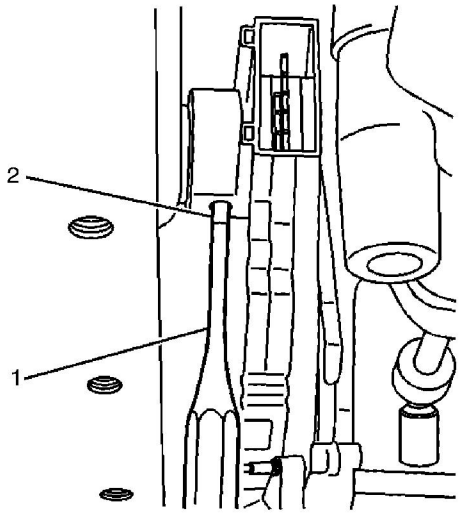
22. Using a suitable tool, remove and discard the cup plug.



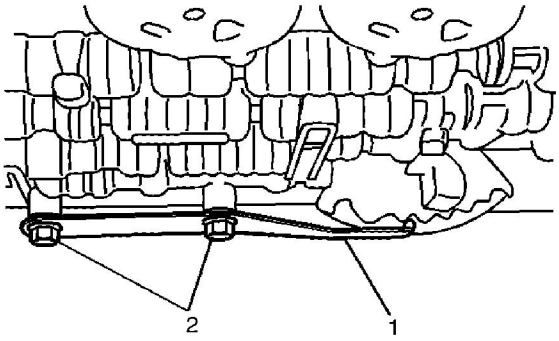
Note: Removal of the transmission is NOT required for the removal or replacement of the shift shaft position switch. Remove the transmission from the vehicle and refer to Unit Repair for replacement of the manual shift shaft ONLY if replacement of the manual shift shaft (3) is necessary.

23. Remove the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.
24. Disconnect the selector lever electrical connector from the selector lever shaft position

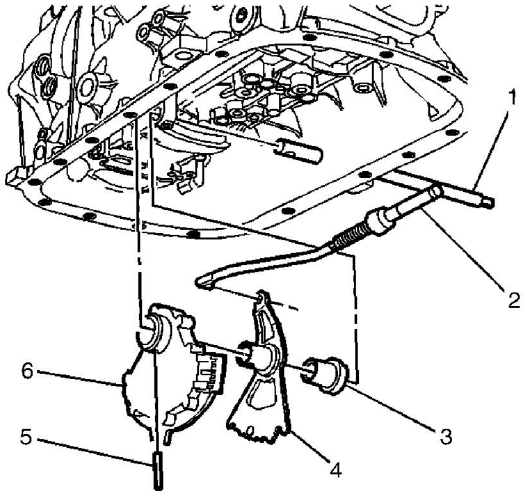
switch.



25. Using a suitable pin punch (1), remove the selector lever shaft position switch retaining pin (2).

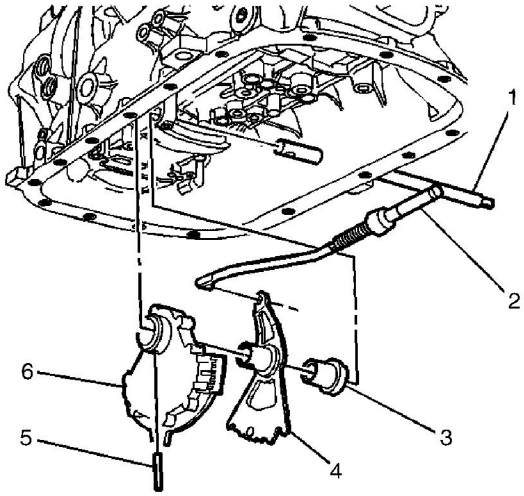


26. Remove the selector lever shaft detent spring (1) and retaining bolts (2).

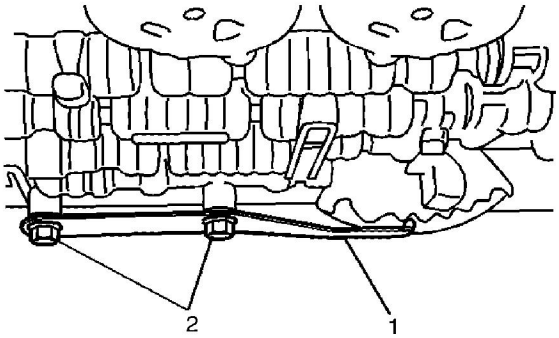


27. Extract the manual shift shaft (1) from the transmission case only far enough to allow removal of the manual shift shaft position switch (6).
28. Remove the manual shift shaft position switch (6), the manual shift shaft detent lever (4), the manual shift shaft assembly spacer (3), and the park pawl actuator (2) as an assembly.

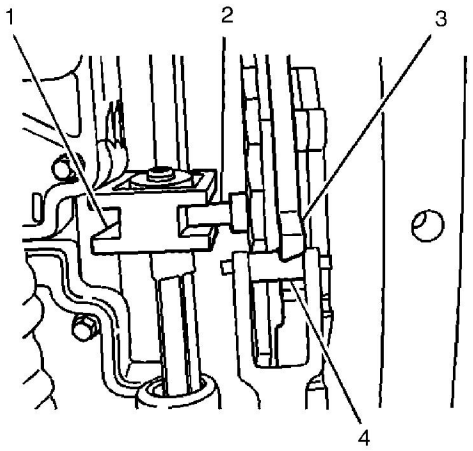
Installation Procedure



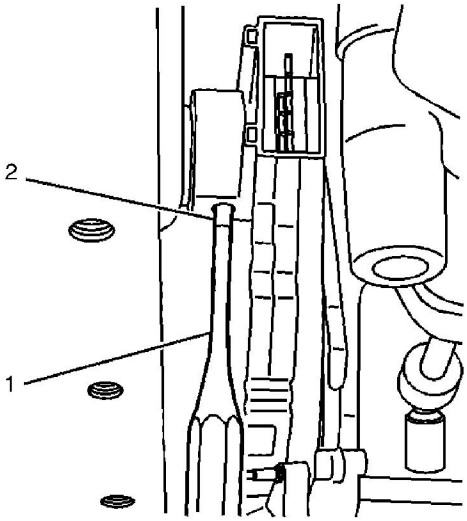
1. Install the manual shift shaft position switch (6), the manual shift shaft detent lever (4), the manual shift shaft assembly spacer (3), and the park pawl actuator (2) as an assembly. It may be necessary to push up on the park pawl in order to fully insert the park pawl actuator (2).
2. Fully insert the manual shift shaft (1) into the transmission case.



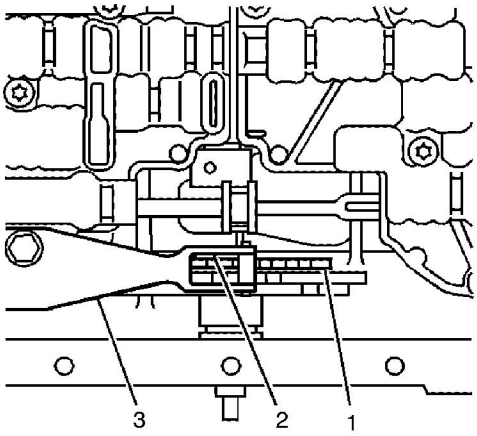
3. Install the manual shift shaft detent spring (1).
4. Install the control valve body bolts (2) retaining the manual shift shaft detent spring. Do not tighten at this time.



5. Confirm that the manual shift shaft detent lever locating pin (2) is properly engaged with the manual valve link (1).
6. Confirm that the detent spring roller (4) is properly engaged with the manual shift shaft switch (3).



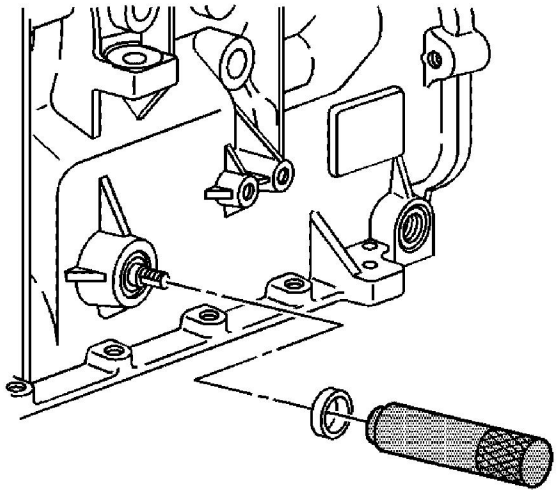
7. Using a suitable pin punch (1), install the manual shift shaft position switch retaining pin (2).
8. Connect the electrical connector to the manual shift shaft position switch.



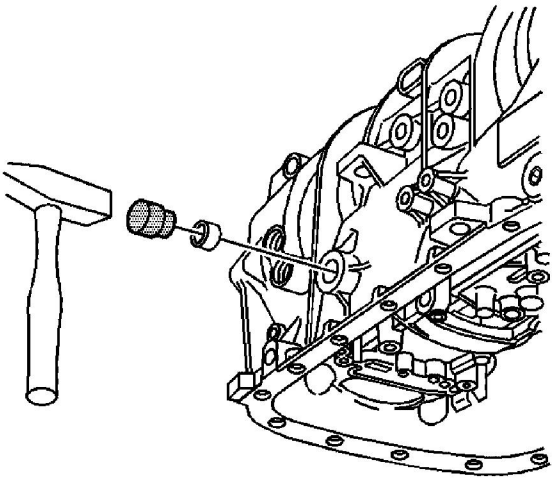
9. Install a 0.8 mm spacer (2) between the manual shaft detent lever (1) and the manual shaft detent spring (3).

Caution: Refer to Fastener Caution in the Preface section.

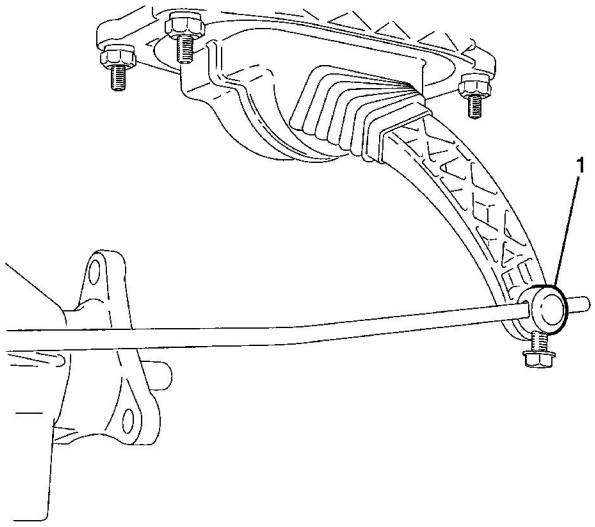
10. Tighten the detent spring bolts to **11 N·m (97 lb in)**.
11. Remove the spacer (2).
12. Install the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.



13. If previously removed, install a new shaft seal using J 44767 .
14. Position the seal onto the J 44767 before installing the seal into the transmission case.
15. Carefully slide the seal and tool over the manual shift shaft and insert the seal into the transmission until fully seated



16. If previously removed, install a new cup plug. Lubricate the cup plug with transmission fluid before installation.
17. Insert the cup plug into the transmission until flush with the transmission case.
18. Remove engine and transmission lowering blocks and engine balance plate.
19. Raise the powertrain back up into the engine bay and tighten front sub-frame bolts to **191 N·m (141 lb ft)**.
20. Install the propeller shaft coupler (1) to the transmission flange. Refer to Propeller Shaft Replacement.
21. Install the exhaust system. Refer to Exhaust System Replacement.



22. Connect the shift linkage to the transmission manual shift shaft.
23. Install the transmission manual shift shaft nut and tighten to **15 N·m (11 lb ft)**.
24. Adjust the shift control linkage. Refer to Shift Control Linkage Adjustment.
25. Lower the vehicle.

Note: It is recommended that transmission adaptive pressure (TAP) information be reset.

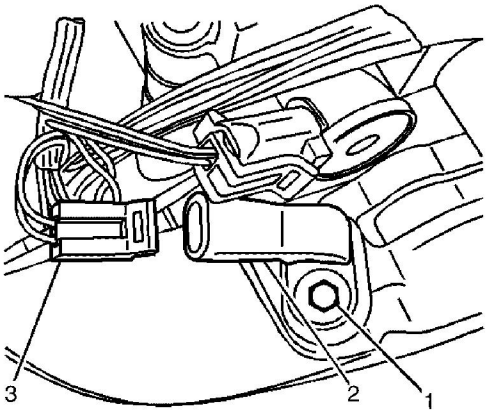
Resetting the TAP values using a scan tool will erase all learned values in all cells. As a result, the ECM or TCM will need to relearn TAP values. Transmission performance may be affected as new TAP values are learned.

26. Reset the TAP values. Refer to Transmission Adaptive Functions.

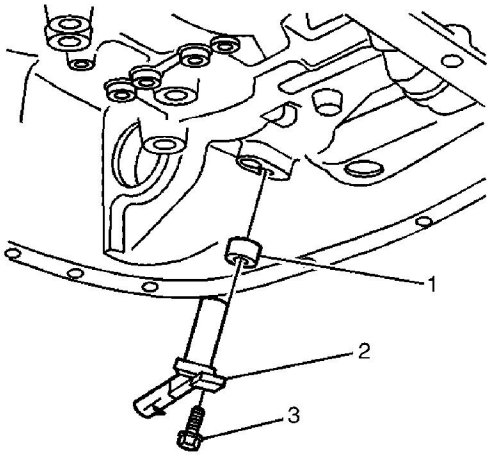
Output Speed Sensor Replacement

Removal Procedure

1. Remove the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.



2. Disconnect the electrical connector (3) from the output speed sensor (2).

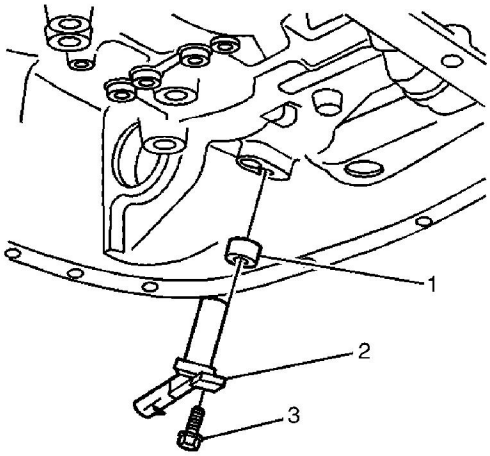


3. Remove the output speed sensor retaining bolt (3).
4. Remove the output speed sensor (2).
5. Remove the output speed sensor spacer (1).

© 2010 General Motors Corporation. All rights reserved.

6. Inspect the output speed sensor (2) for the following conditions:
   - Damaged or missing magnet
   - Damaged housing
   - Bent or missing electrical terminals

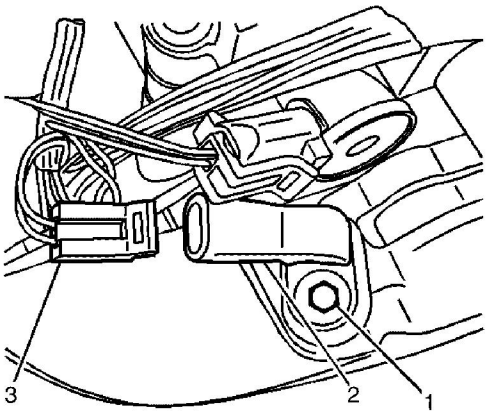
Installation Procedure



1. Install the output speed sensor spacer (1).
2. Install the output speed sensor (2).

Caution: Refer to Fastener Caution in the Preface section.

3. Install the output speed sensor retaining bolt (3) and tighten to **11 N·m (97 lb in)**.

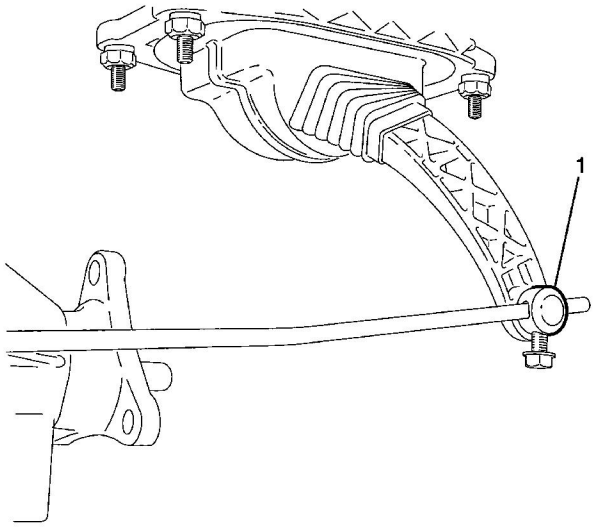


4. Connect the electrical connector (3) to the output speed sensor (2).
5. Install the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.

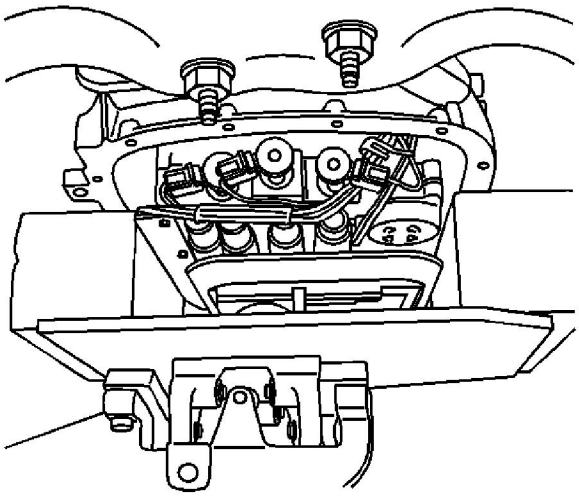
Parking Pawl Replacement

Removal Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.

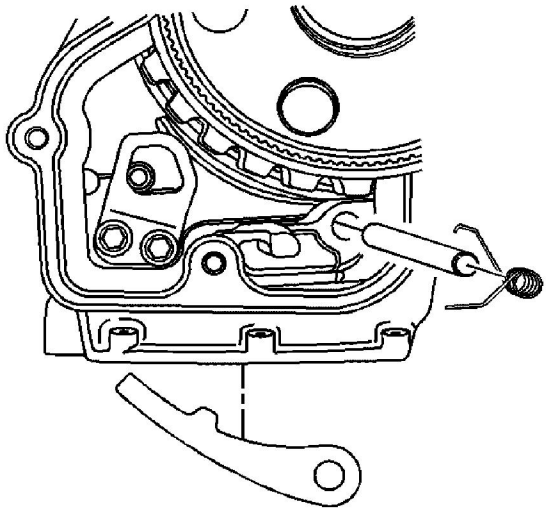


2. Remove the transmission manual selector lever shaft nut.
3. Disconnect the selector lever linkage from the transmission.
4. Place the transmission in neutral by rotating the transmission shift shaft clockwise 2 clicks.
5. Remove the exhaust system. Refer to Exhaust System Replacement.
6. Disconnect the propeller shaft coupler (1) from the transmission flange. Refer to Propeller Shaft Replacement.
7. Remove the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.



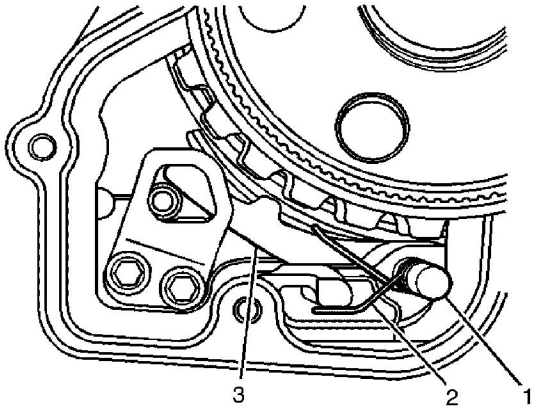
© 2010 General Motors Corporation. All rights reserved.

8. Using 2 equally sized suitable blocks of wood and a suitable transmission jack positioned under the transmission pan area, support the transmission case on both sides with the wood blocks to prevent the transmission internal components from contacting the transmission jack.
9. Remove the transmission support. Refer to Transmission Support Replacement.
10. Remove the extension housing. Refer to Case Extension and Gasket Replacement.



11. Remove the parking pawl spring.
12. Remove the parking pawl pivot pin.
13. Remove the parking pawl.
14. Inspect the following:
    - Parking pawl tooth for chipping or wear
    - Parking pawl spring for over expansion
    - Pivot pin for scoring, excessive wear

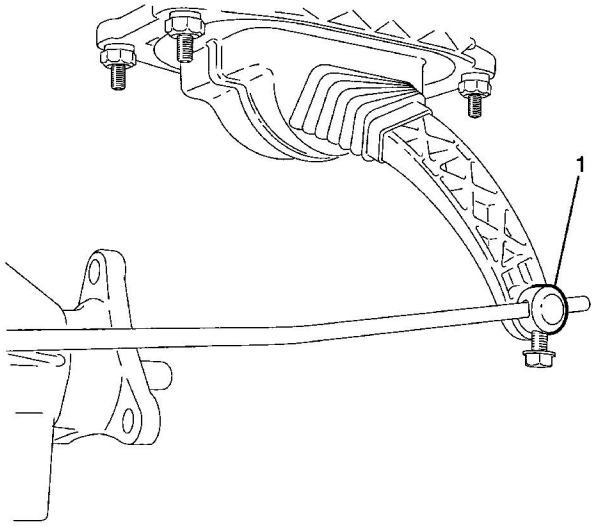
Installation Procedure



1. Install the parking pawl (3).
2. Install the pivot pin (1).

Note: The straight end of the spring locates against the case and the hooked end locates over the parking pawl.

3. Install the parking pawl spring (2).
4. Install the extension housing. Refer to Case Extension and Gasket Replacement.
5. Install the transmission support. Refer to Transmission Support Replacement.
6. Remove the transmission jack.
7. Install the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.
8. Install the propeller shaft. Refer to Propeller Shaft Replacement.
9. Install the exhaust system. Refer to Exhaust System Replacement.



10. Place the transmission in the park position by rotating the shift shaft fully counter clockwise.
11. Connect the shift linkage to the transmission.

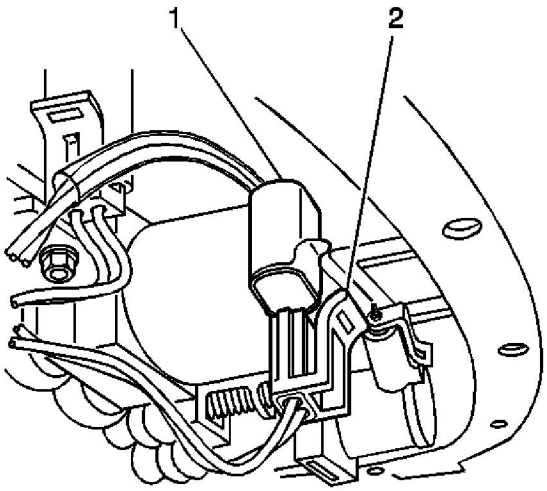
Caution: Refer to Fastener Caution in the Preface section.

12. Install the transmission manual shift shaft nut and tighten to **15 N·m (11 lb ft)**.
13. Fill the transmission to the correct level. Refer to Transmission General Specifications, Fluid Capacity Specifications, and Transmission Fluid Check.
14. Lower the vehicle.

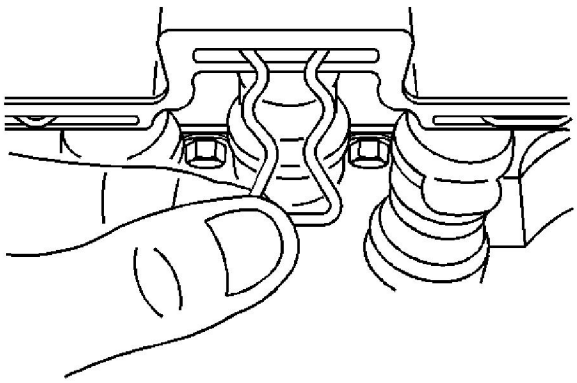
Pressure Control Solenoid Valve Replacement

Removal Procedure

1. Remove the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.

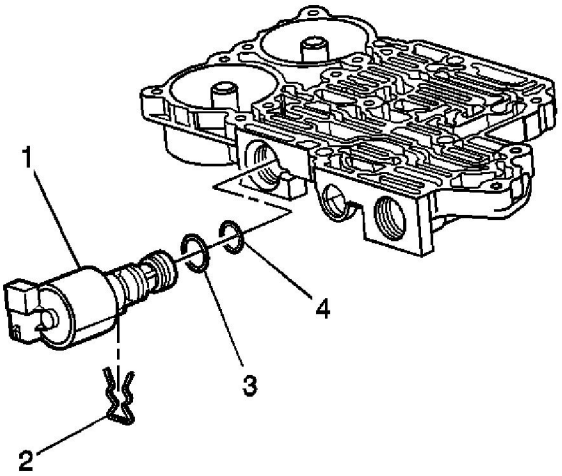


2. Disconnect the electrical connector (2) from the pressure control solenoid (1).



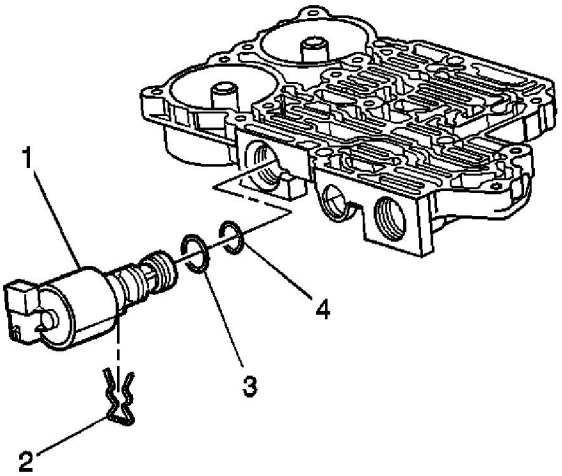
3. Using a small suitable tool, remove the pressure control solenoid retainer from the control valve body.

© 2010 General Motors Corporation. All rights reserved.

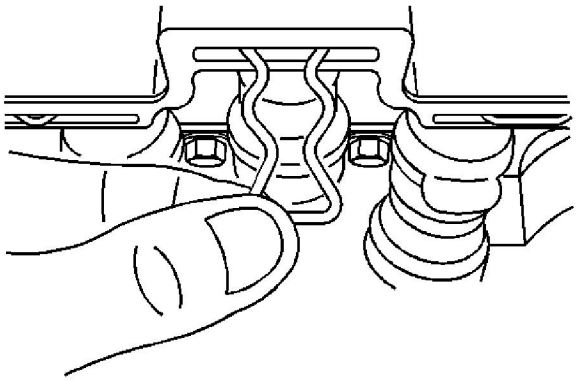


4. Remove the pressure control solenoid (1) from the control valve body.
5. Remove the O-ring seals (3-4) from the pressure control solenoid (1), ONLY if the O-rings are cut or worn.

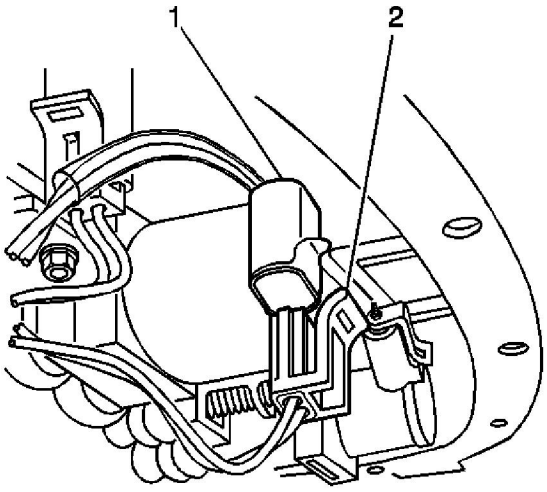
Installation Procedure



1. Install new O-ring seals (3-4) to the pressure control solenoid (1), if the O-rings were previously removed.
2. Install the pressure control solenoid (1) into the control valve body.



3. Install the pressure control solenoid retainer into the control valve body.



4. Connect the electrical connector (2) to the pressure control solenoid (1).
5. Install the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.

Important: It is recommended that transmission adaptive pressure (TAP) information be reset.

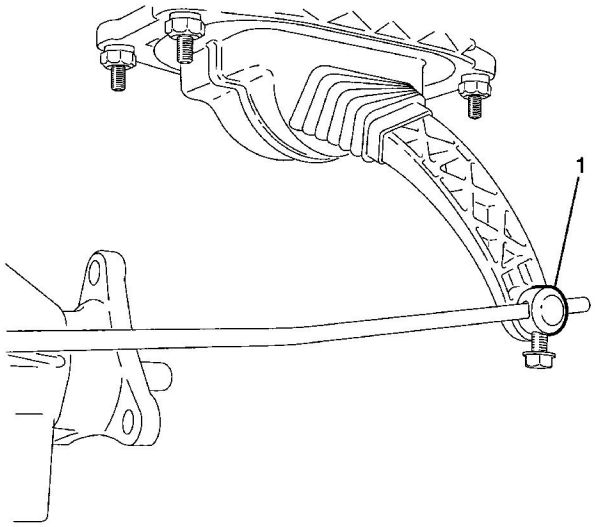
Resetting the TAP values using a scan tool will erase all learned values in all cells. As a result, The ECM or TCM will need to relearn TAP values. Transmission performance may be affected as new TAP values are learned.

6. Reset the TAP values. Refer to Transmission Adaptive Functions.

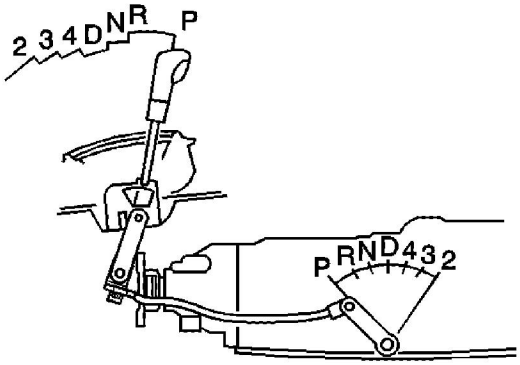
Shift Control Linkage Adjustment

1. Position the shift lever in PARK.
2. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.

Caution: Refer to Fastener Caution in the Preface section.



3. Loosen the shift control linkage adjustment bolt to allow the adjuster (1) to slide freely.
4. Hold the selector lever on the transmission against the rear stop to eliminate any play. Tighten the shift control linkage adjustment nut **9 N·m (80 lb. in)**.
5. Lower the vehicle.



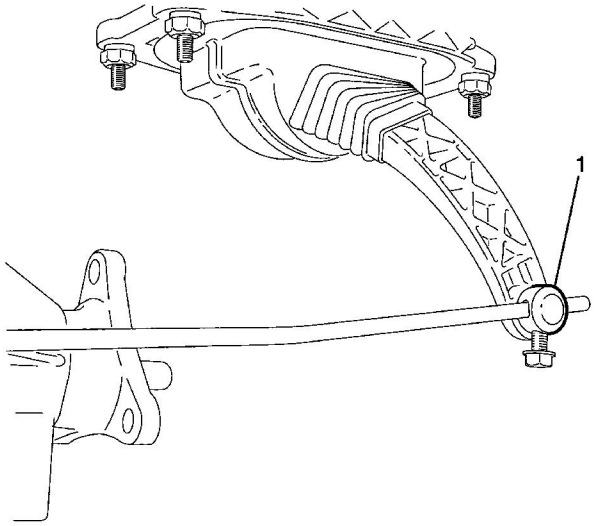
© 2010 General Motors Corporation. All rights reserved.

6. Check the operation of the starting system with the shift lever in each position. The engine should only crank when the lever is in the PARK or NEUTRAL position.

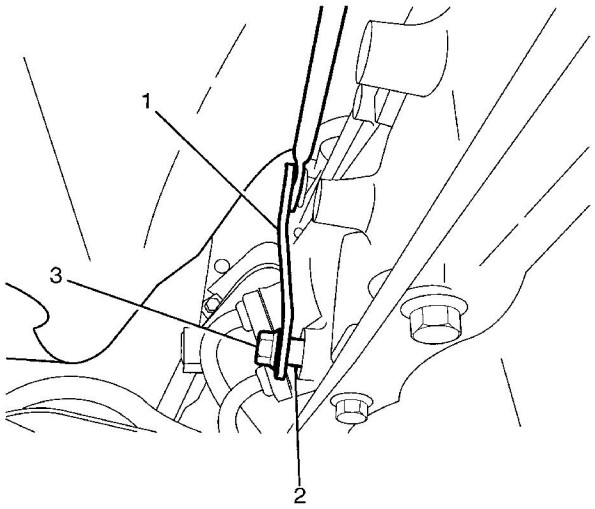
Shift Control Linkage Replacement

Removal Procedure

1. Place the selector lever in PARK.
2. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.



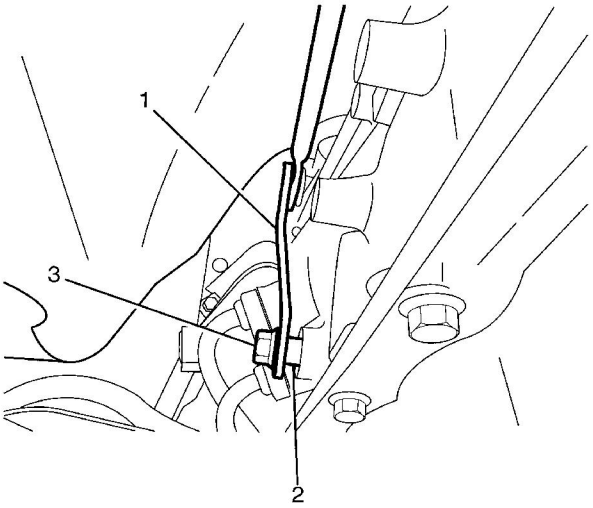
3. Remove the nut from the shift control linkage rod.
4. Disconnect the shift control linkage rod from the shift control.



5. Remove the shift selector linkage rod to shift selector shaft retaining nut (3).
6. Remove the shift selector linkage rod (1) from the shift selector shaft (2).

© 2010 General Motors Corporation. All rights reserved.

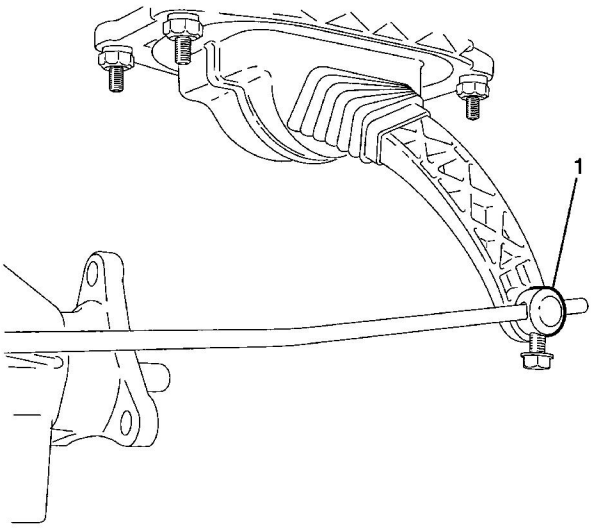
Installation Procedure



1. Install the shift selector linkage rod (1) to the shift selector shaft (2).

   Caution: Refer to Fastener Caution in the Preface section.

2. Install the shift selector linkage rod to shift selector shaft retaining nut (3) and tighten to **9 N·m (80 lb in)**.



3. Connect the shift control linkage rod to the shift control assembly.
4. Install the nut to the shift control linkage rod.
5. Adjust the shift control linkage. Refer to Shift Control Linkage Adjustment.
6. Lower the vehicle.

Torque Converter Clutch / Cruise Control Release Switch Adjustment

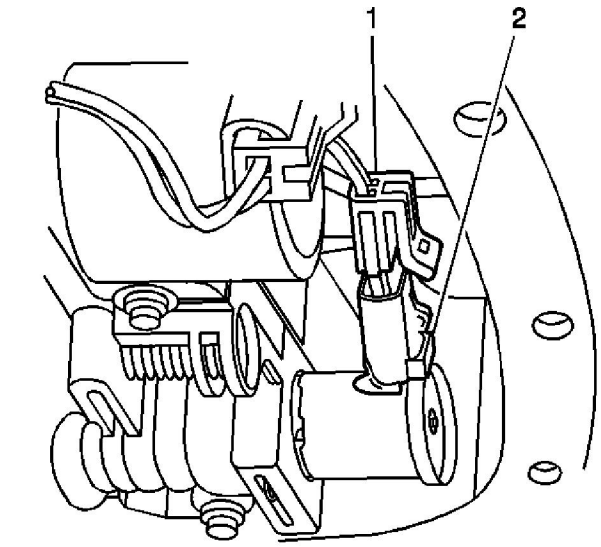
Refer to Stop Lamp Switch Adjustment.

© 2010 General Motors Corporation. All rights reserved.

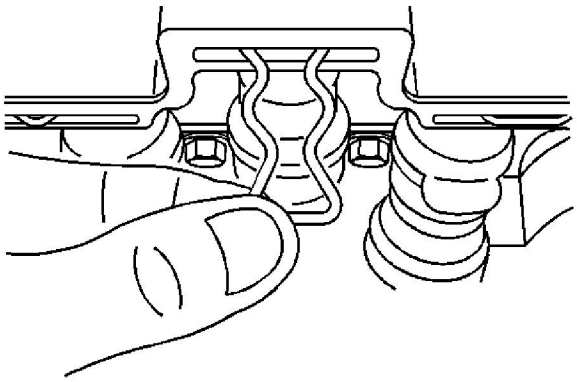
Torque Converter Clutch Solenoid Replacement

Removal Procedure

1. Remove the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.

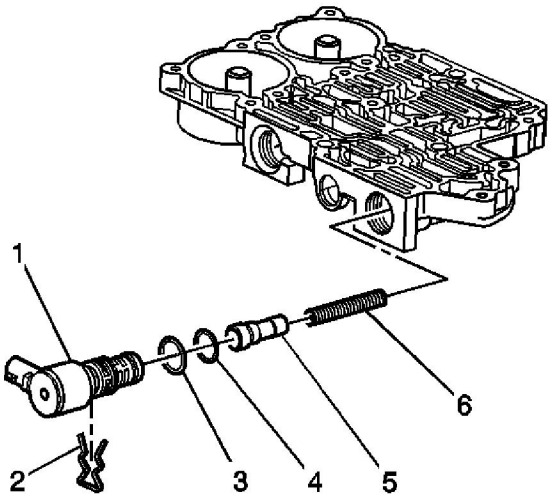


2. Disconnect the electrical connector (1) from the torque converter clutch (TCC) pulse width modulation (PWM) solenoid valve (2).



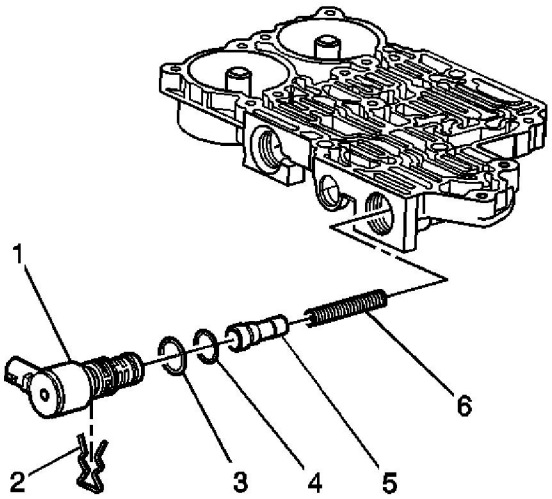
3. Using a small suitable tool, remove the TCC PWM solenoid valve retainer from the control valve body.

© 2010 General Motors Corporation. All rights reserved.

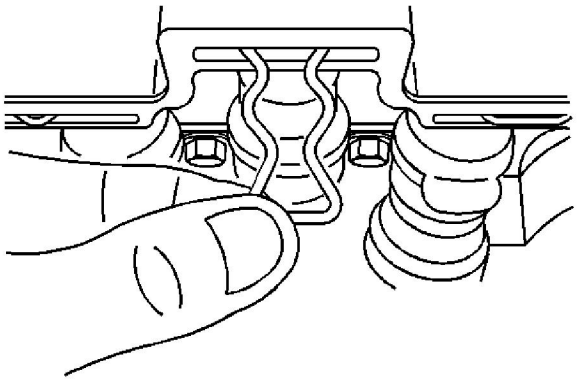


4. Remove the TCC PWM solenoid valve (1) from the control valve body.
5. Remove the O-ring seals (3-4) from the TCC PWM solenoid valve (1), ONLY if the O-rings are cut or worn.

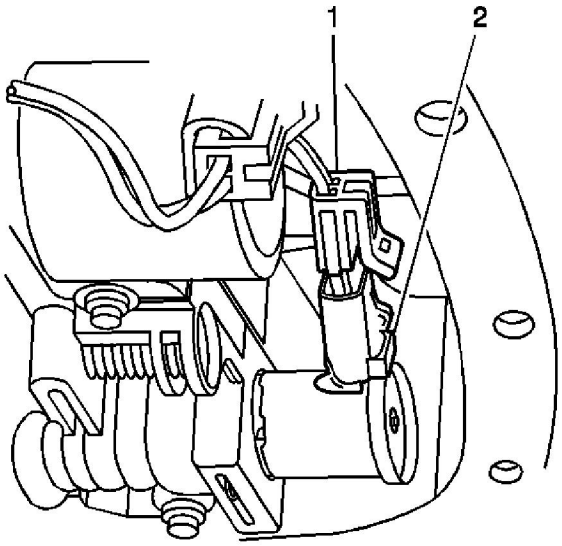
Installation Procedure



1. Install new O-ring seals (3-4) to the torque converter clutch (TCC) pulse width modulation (PWM) solenoid valve (1), if the O-rings were previously removed.
2. Install the TCC PWM solenoid valve (1) into the control valve body.



3. Install the TCC PWM solenoid valve retainer into the control valve body.



4. Connect the electrical connector (1) to the TCC PWM solenoid valve (2).
5. Install the transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.

Important: It is recommended that transmission adaptive pressure (TAP) information be reset.

Resetting the TAP values using a scan tool will erase all learned values in all cells. As a result, The ECM or TCM will need to relearn TAP values. Transmission performance may be affected as new TAP values are learned.

6. Reset the TAP values. Refer to Transmission Adaptive Functions.

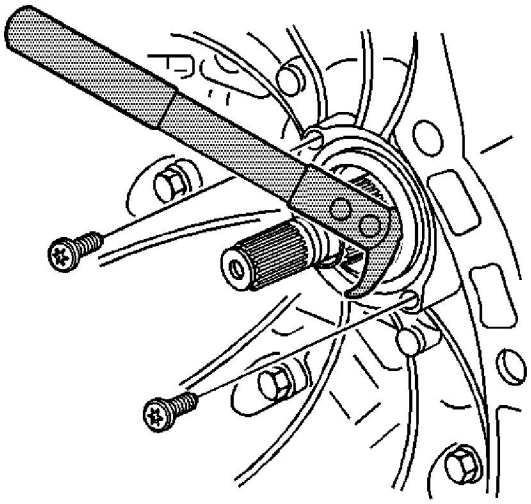
Torque Converter Fluid Seal Replacement

Special Tools

- J 8092 Universal driver Handle
- J 44766 Seal Installer
- J 45000 Seal Remover

Removal Procedure

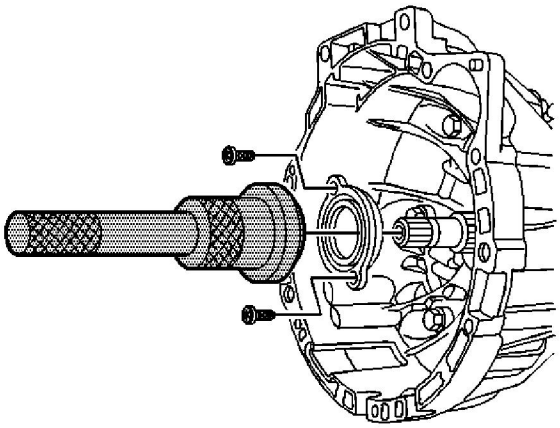
1. Remove the transmission torque converter. Refer to Torque Converter Replacement.



2. Remove and discard the torque converter seal retaining bolts.
3. Remove the torque converter seal using J 45000 .

Installation Procedure

© 2010 General Motors Corporation. All rights reserved.



1. Assemble J 8092 onto J 44766 .
2. Install the torque converter seal onto the tool before installing into the case to prevent damage to the seal.

   Note: Align the torque converter seal with the bolt holes.

3. Install the torque converter seal into the torque converter housing.

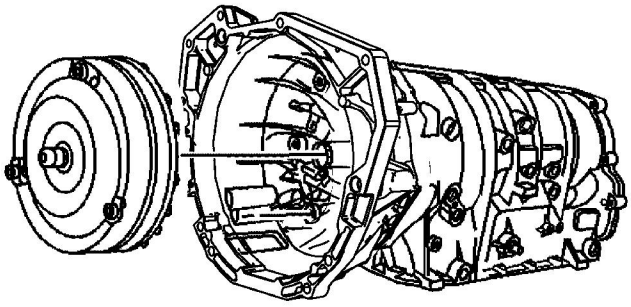
   Caution: Refer to Fastener Caution in the Preface section.

4. Install the NEW torque converter seal retaining bolts and tighten to **3.6 N·m (32 lb. in)**.
5. Install the transmission torque converter. Refer to Torque Converter Replacement.

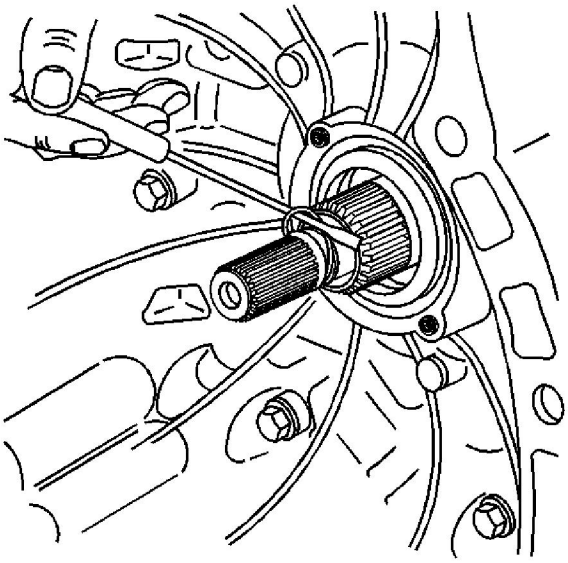
Torque Converter Replacement

Removal Procedure

1. Remove the transmission from the vehicle. Refer to Transmission Replacement.



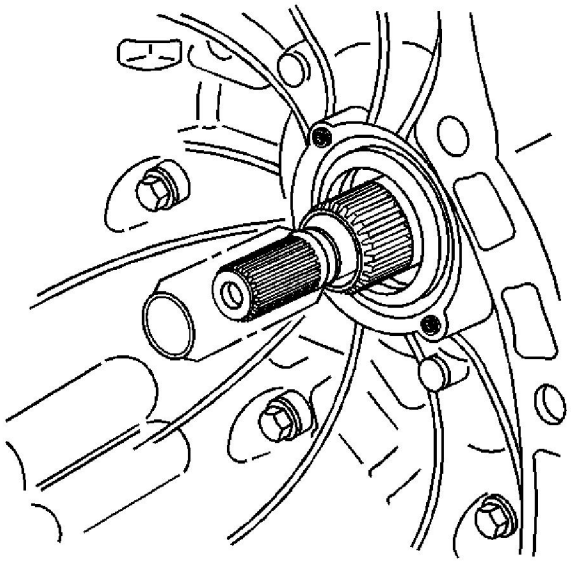
2. Remove the torque converter from the transmission.



3. Remove the input shaft seal. Refer to Torque Converter Fluid Seal Replacement.

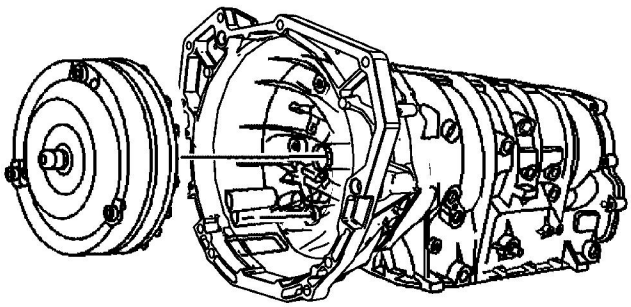
Installation Procedure

© 2010 General Motors Corporation. All rights reserved.



Important: Take care to prevent cutting of the input shaft seal on the input shaft splines.

1. Install the input shaft seal. Refer to Torque Converter Fluid Seal Replacement.



Important: Ensure the torque converter is fully seated into the transmission pump drive gear and turbine shaft.

2. Install the torque converter. Push the torque converter into position while rotating.
   - The torque converter must be fully seated on the turbine shaft
   - The torque converter must be fully seated in the pump drive gear

3. Install the transmission to the vehicle. Refer to Transmission Replacement.

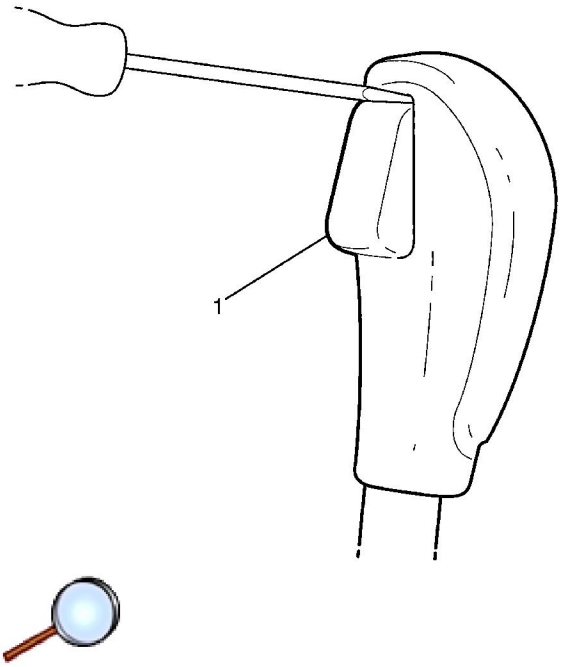
   Important: It is recommended that transmission adaptive pressure (TAP) information be reset.

   Resetting the TAP values using a scan tool will erase all learned values in all cells. As a result, The ECM or TCM will need to relearn TAP values. Transmission performance may be affected as new TAP values are learned.

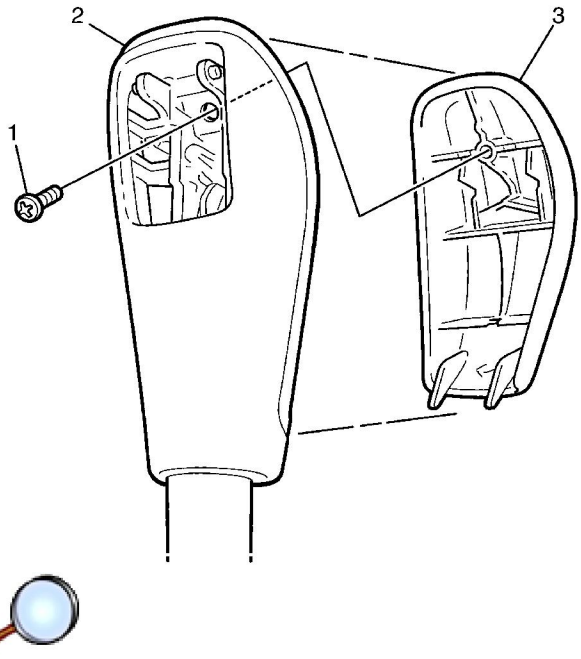
4. Reset the TAP values. Refer to Transmission Adaptive Functions.

Transmission Control Lever Knob Replacement

Removal Procedure

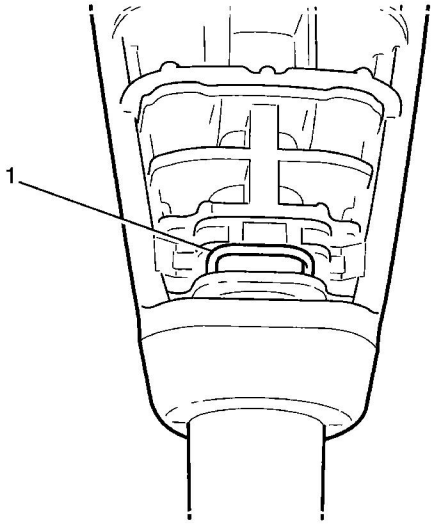


1. Using a suitable tool lever release knob (1) out of selector lever



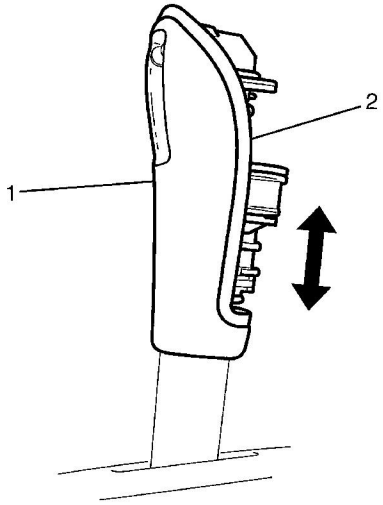
2. Remove selector retaining screw (1) from the selector lever (2) and remove lever backing (3).

© 2010 General Motors Corporation. All rights reserved.

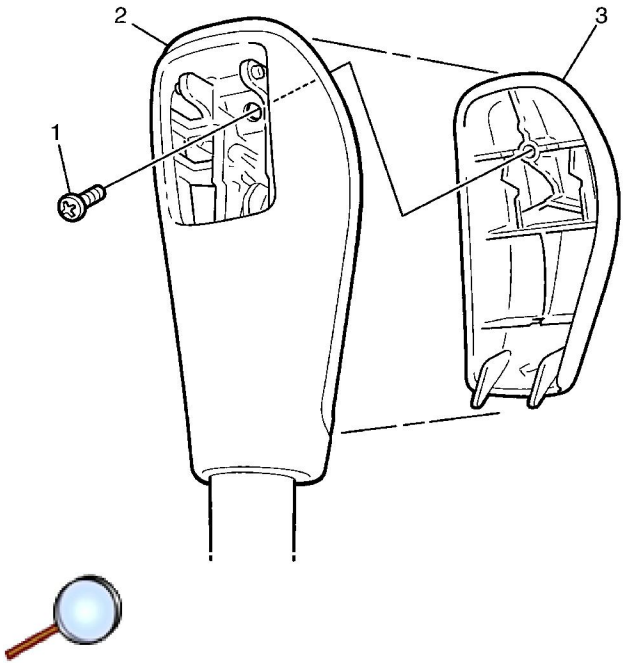


3. Remove the selector lever knob metal retainer clip (1).
4. Remove selector lever knob spacer.
5. Remove selector lever knob by sliding upwards off assembly.

Installation Procedure



1. Install the selector lever knob (1) by sliding down on the assembly.
2. Install the selector lever knob spacer (2).
3. Install the selector lever knob metal retainer clip.

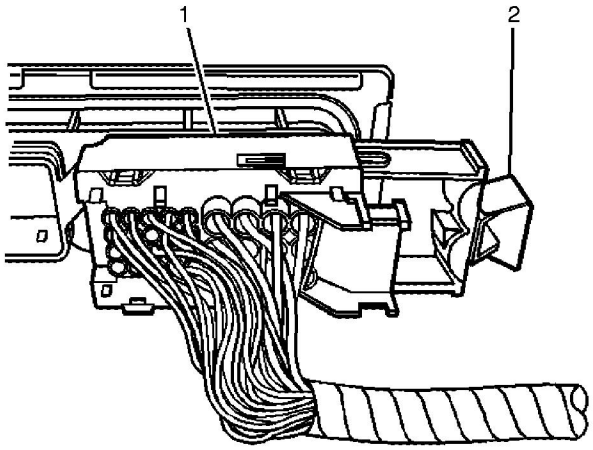


4. Install the lever backing (3) and retaining screw (1) to the selector lever (2).
5. Install the release knob into selector lever.

Transmission Control Module Replacement

Removal Procedure

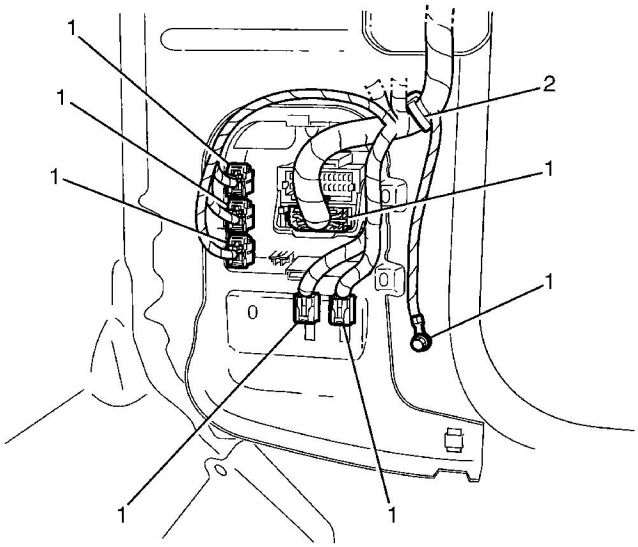
1. Remove the right side hinge pillar trim from the vehicle. Refer to Body Hinge Pillar Trim Panel Replacement .
2. Remove the knee bolster assembly. Refer to Knee Bolster Replacement .



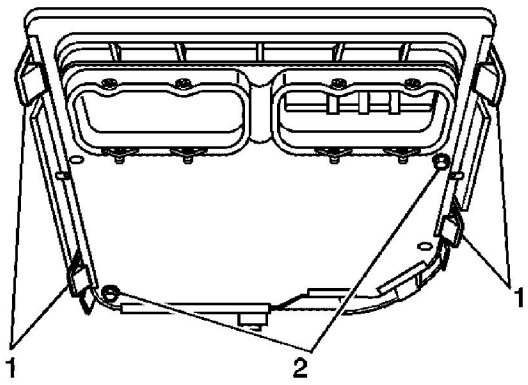
3. Unlock the transmission control module electrical connector by pulling the retainer (2) away from the electrical connector (1).

Important: Twisting or tilting of the transmission control module electrical connector while disconnecting may result in bent or misaligned electrical terminal pins.

© 2010 General Motors Corporation. All rights reserved.

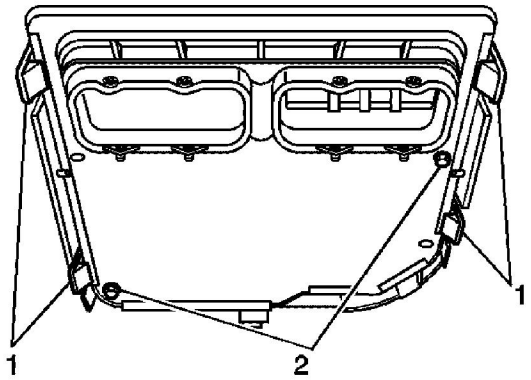


4. Carefully disconnect the electrical connector (1) from the transmission control module.
5. Disconnect the electrical connectors (1) from right hand side junction box and position loom towards the cowl

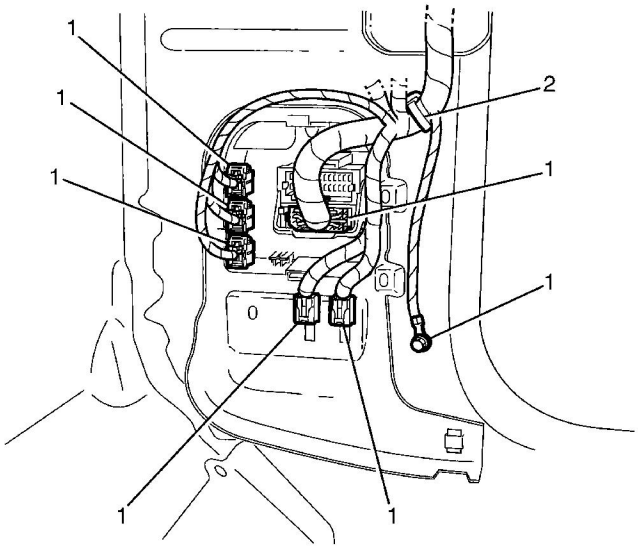


6. Remove the transmission control module from the mounting bracket by pulling back on the retaining tabs (1) to release the control module .

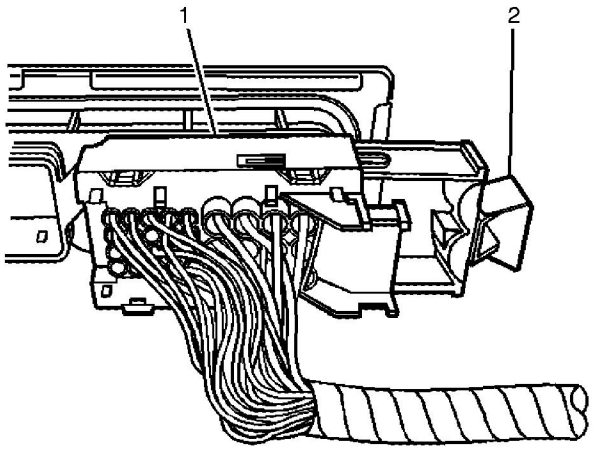
Installation Procedure



1. Align the transmission control module with the locating pins (2) on the module mounting bracket.
2. Install the transmission control module by seating it fully into the bracket until all of the retaining tabs (1) have engaged the edge of the module edge.



3. Install connectors (1) into the right hand side junction box



Important: Twisting or tilting of the transmission control module electrical connector while connecting may result in bent or misaligned electrical terminal pins.

4. Carefully connect the transmission control module electrical connector (1) to the transmission control module.
5. Lock the transmission control module electrical connector securely to the transmission control module by pushing the retainer (2) toward the electrical connector (1) until fully seated.
6. Install the right side hinge pillar trim on the vehicle. Refer to Body Hinge Pillar Trim Panel Replacement .
7. Install the knee bolster assembly. Refer to Knee Bolster Replacement .
8. If re-programming is required. Refer to Control Module References .

Important: It is recommended that transmission adaptive pressure (TAP) information be reset.

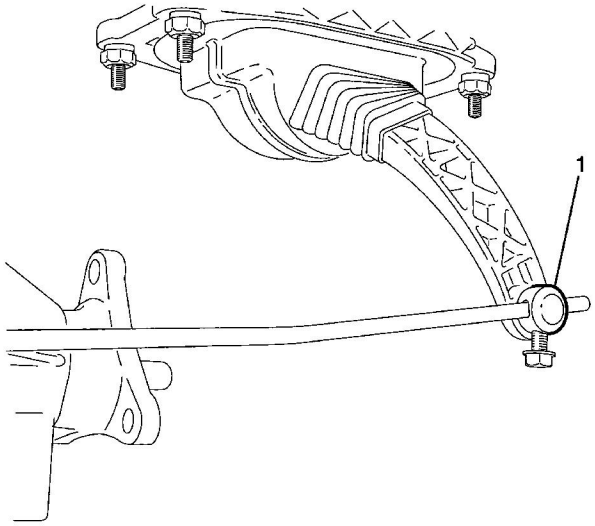
Resetting the TAP values using a scan tool will erase all learned values in all cells. As a result, The ECM or TCM will need to relearn TAP values. Transmission performance may be affected as new TAP values are learned.

9. Reset the TAP values. Refer to Transmission Adaptive Functions .

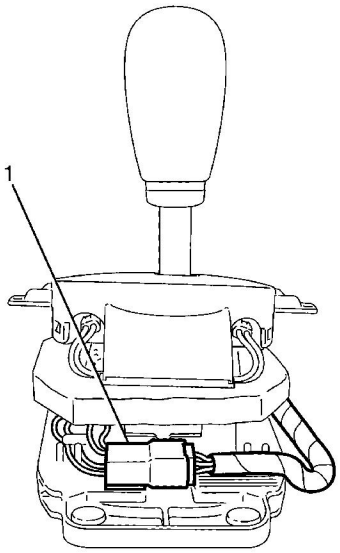
Transmission Control Replacement

Removal Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.

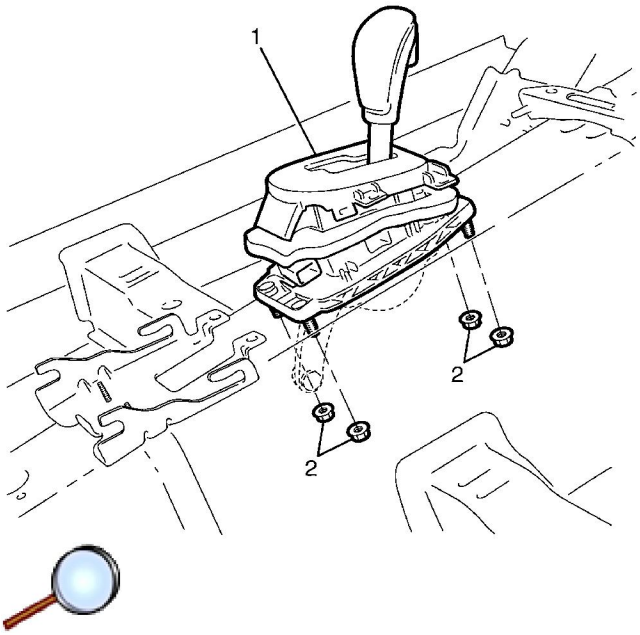


2. Remove the adjustment nut (1) from the shift control linkage.
3. Disconnect the shift control linkage rod from the shift control assembly.
4. Lower the vehicle.
5. Remove the center console assembly. Refer to Front Floor Console Replacement.



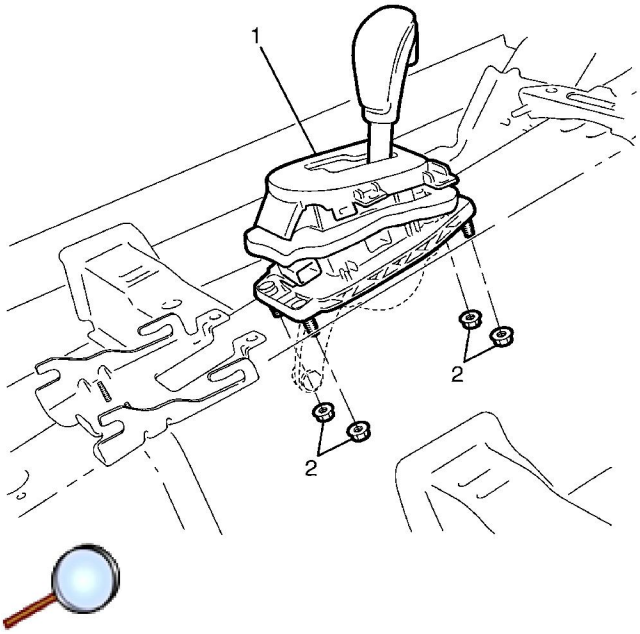
6. Remove the electrical connector (1) from the shift control assembly.

© 2010 General Motors Corporation. All rights reserved.



7. Remove the nuts (2) securing the shift control assembly to the tunnel reinforcement.
8. Remove the shift control assembly (1) from the tunnel reinforcement.

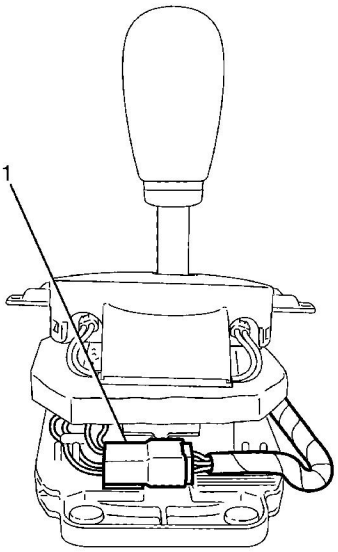
Installation Procedure



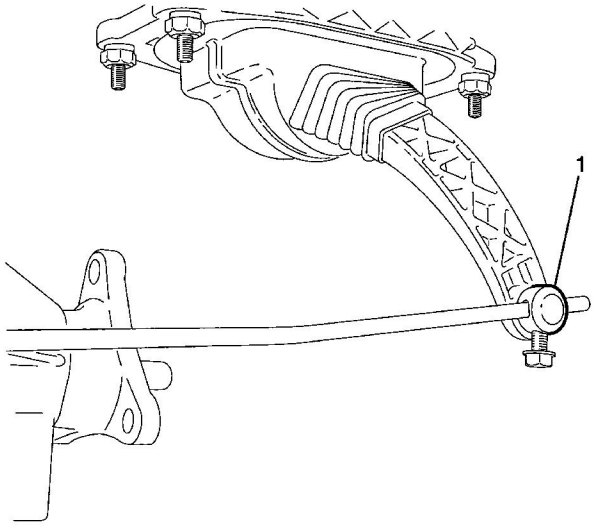
1. Install the shift control assembly (1) to the tunnel reinforcement.

   Caution: Refer to Fastener Caution in the Preface section.

2. Install the nuts (2) securing the shift control assembly to the tunnel reinforcement and tighten to **12 N·m (106 lb. in)**.



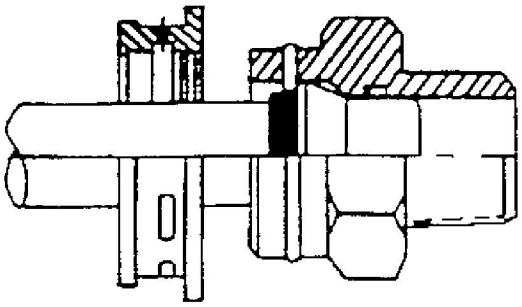
3. Install the electrical connector (1) to the shift control assembly.
4. Install the centre console assembly. Refer to Front Floor Console Replacement.
5. Install the shift control trim plate by inserting the front retaining tabs to the console. Press down on the rear of the trim plate to engage the rear retaining tabs.
6. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.



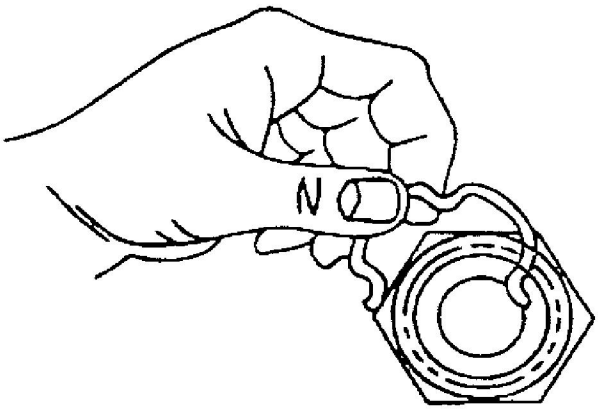
7. Connect the shift control linkage rod to the shift control assembly.
8. Install the shift control linkage adjustment nut finger tight.
9. Adjust the shift control linkage. Refer to Shift Control Linkage Adjustment.
10. Lower the vehicle.

Transmission Fluid Cooler Hose/Pipe Quick-Connect Fitting Disconnection and Connection

Removal Procedure

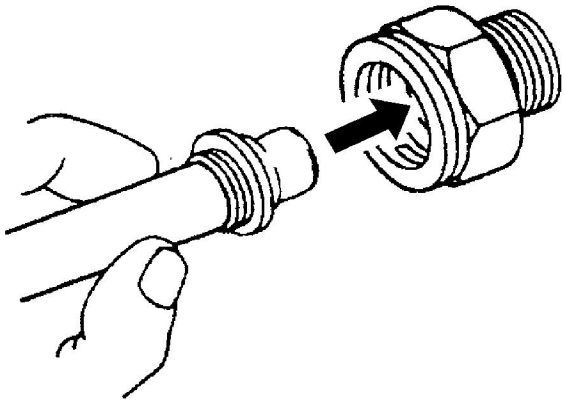


1. Remove the plastic cap from the quick connect fitting.



2. Remove the retaining ring from the quick connect fitting.

© 2010 General Motors Corporation. All rights reserved.



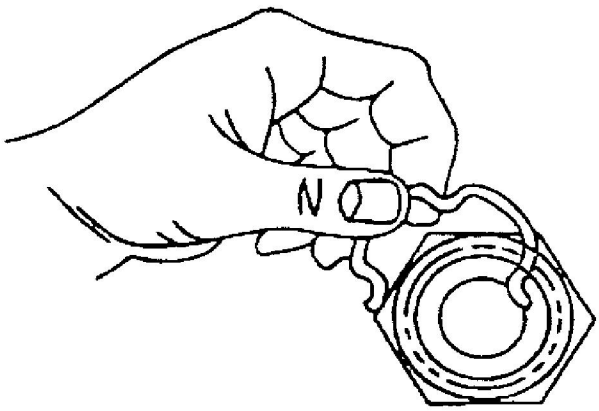
3. Remove the cooler line from the quick connect fitting.

Installation Procedure

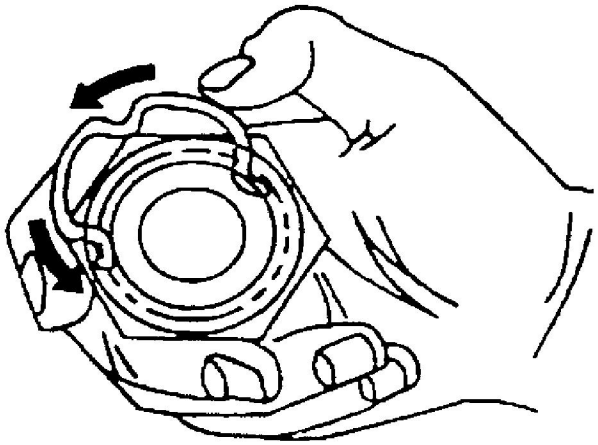
Important:

- Do not reuse any of the existing oil lines or oil line fittings if there is excessive corrosion.
- Do not reuse any of the existing retaining rings that were removed from the existing quick connect fittings. Install new retaining rings.
- Make sure the following procedures are performed when installing the new retaining rings onto the fittings.

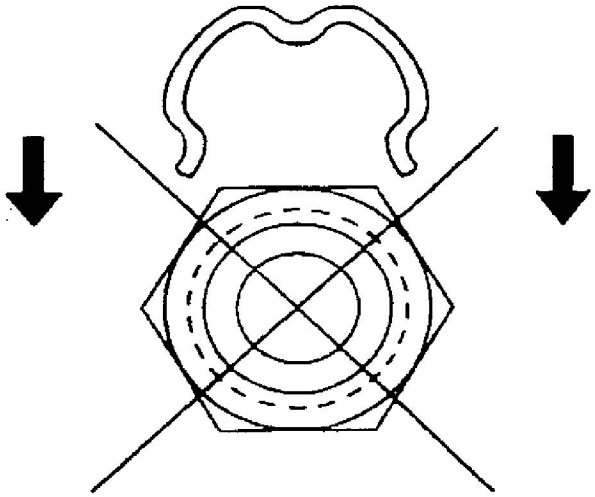
1. Install a new retaining ring into the quick connect fitting using the following procedure:



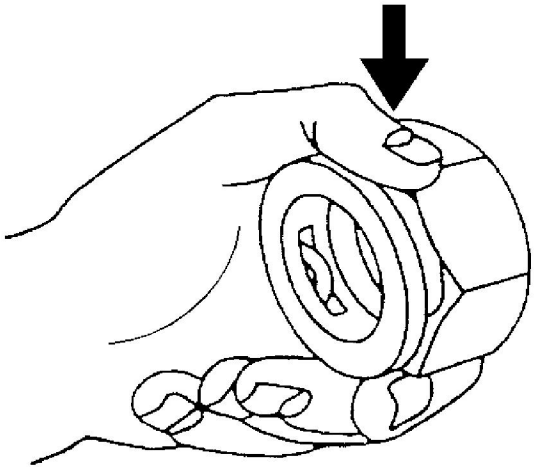
2. Hook one of the open ends of the retaining ring in one of the slots on the quick connect fitting.



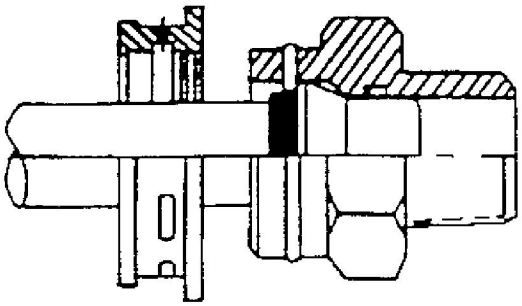
3. Rotate the retaining ring around the fitting until the retaining ring is positioned with all three ears through the three slots on the fitting.



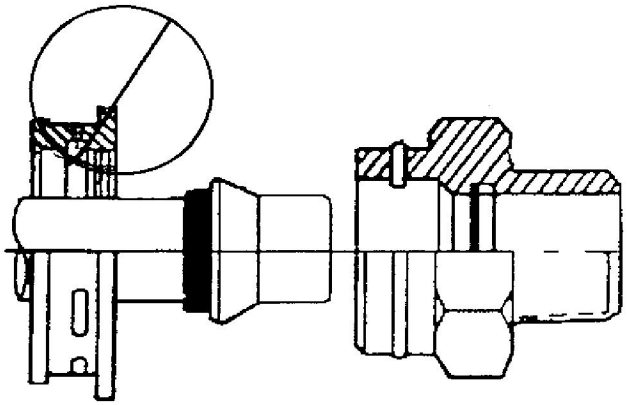
4. Do not install the new retaining ring onto the fitting by pushing the retaining ring.



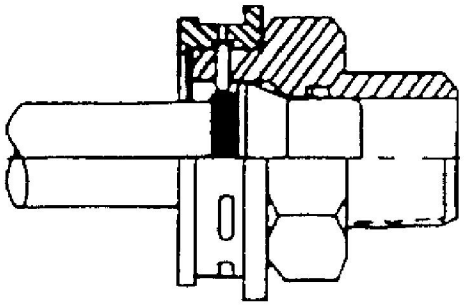
5. Make sure that the three retaining ring ears are seen from inside the fitting and that the retaining ring moves freely in the fitting slots.



6. Install the cooler line into the quick connect fitting.
7. Insert the cooler line end into the quick connect fitting until a click is either heard or felt.

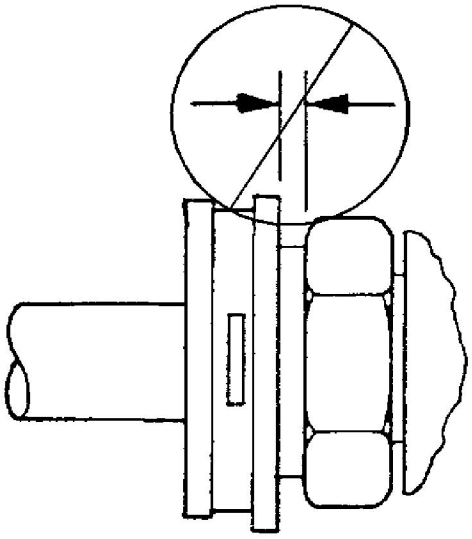


8. Do not use the plastic cap on the cooler line in order to install the cooler line into the fitting.
9. Pull back sharply on the cooler line in order to make sure that the cooler line is fastened into the quick connect fitting.

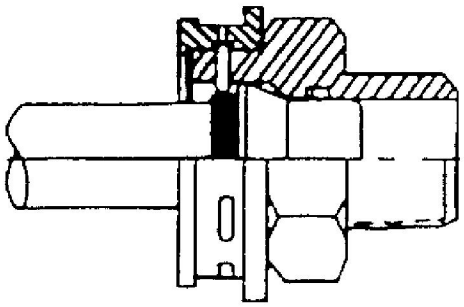


Important: Do not manually depress the retaining clip when installing the plastic cap.

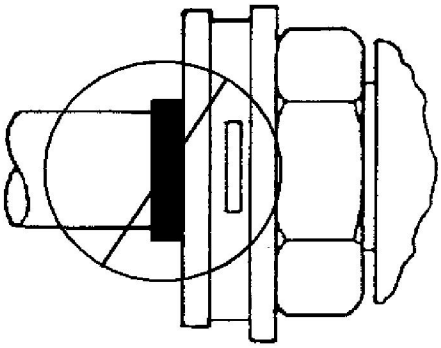
10. Position (snap) the plastic cap onto the fitting. Do not manually depress the retaining ring when installing the plastic cap onto the quick connect fitting.
11. Make sure that the plastic cap is fully seated against the fitting.



12. Make sure that no gap is present between the cap and the fitting.



13. Make sure that the yellow identification band on the tube is hidden within the quick connect fitting.



14. A hidden yellow identification band indicates proper joint seating.
15. Fill the transmission to the proper level with DEXRON® VI transmission fluid. Refer to Transmission Fluid Check.

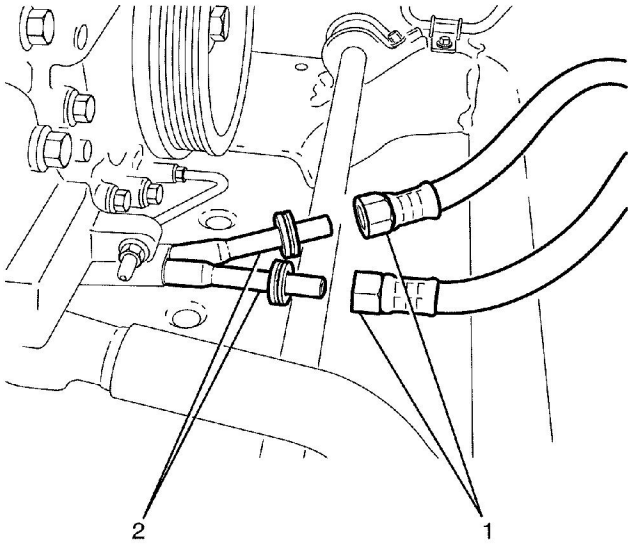
Transmission Fluid Cooler Hose/Pipe Replacement

Special Tools

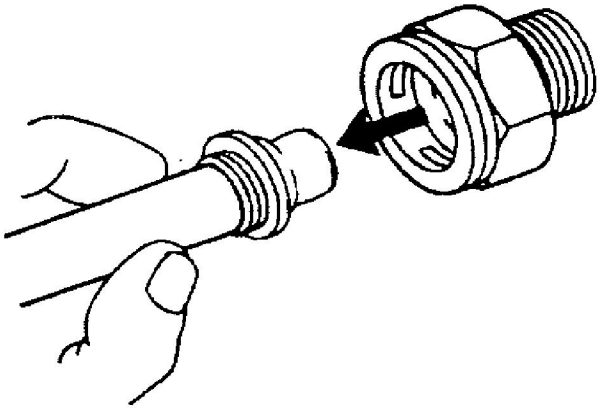
J 44827 Transmission Cooler Quick Disconnect

Removal Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.
2. Remove the front air deflector. Refer to Front Air Deflector Replacement.

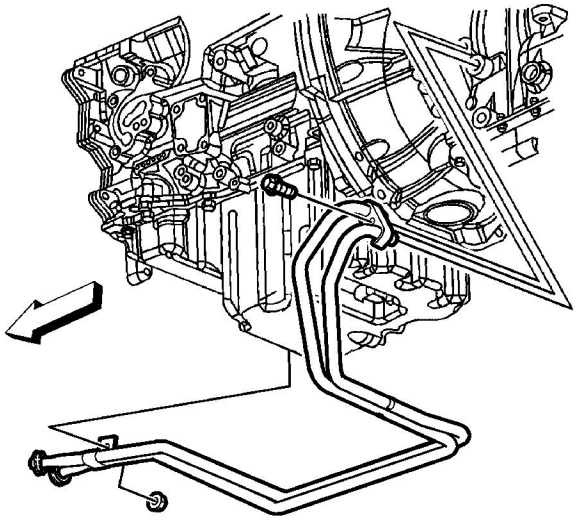


3. Place an oil drain pan under the transmission fluid cooler pipes (1&2) near the radiator.

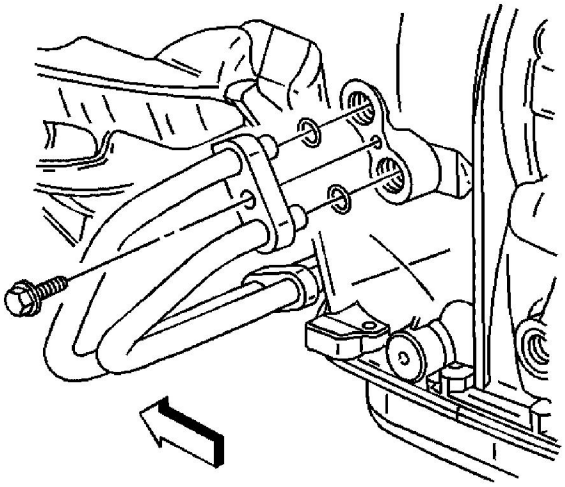


© 2010 General Motors Corporation. All rights reserved.

4. Disconnect the transmission fluid cooler pipes from the transmission fluid cooler by using the J 44827 .

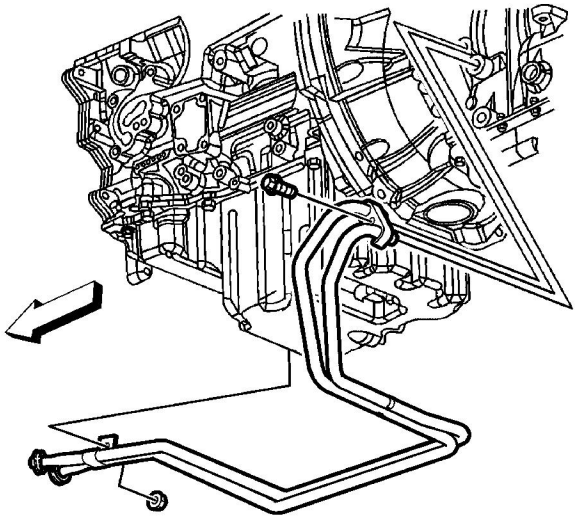


5. Remove the transmission fluid cooler pipes bracket retaining bolt.

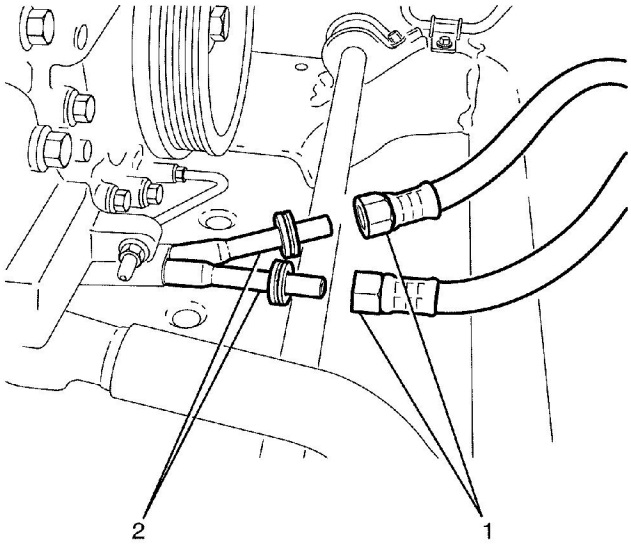


6. Remove the transmission fluid cooler pipes retaining bolt.
7. Remove the transmission fluid cooler pipes.
8. Remove and discard the O-rings. Do not reuse the O-rings.

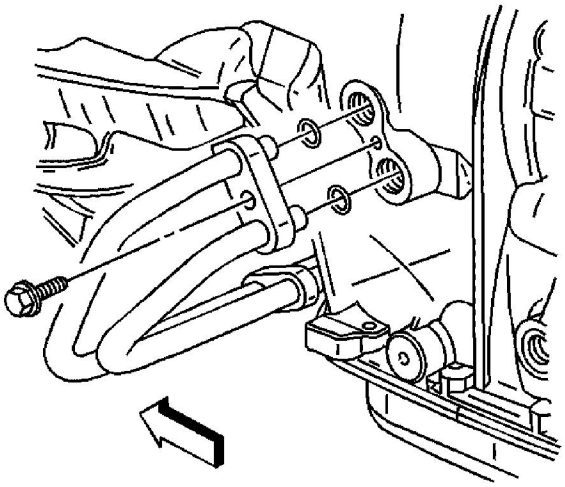
Installation Procedure



1. Install the transmission fluid cooler pipe.



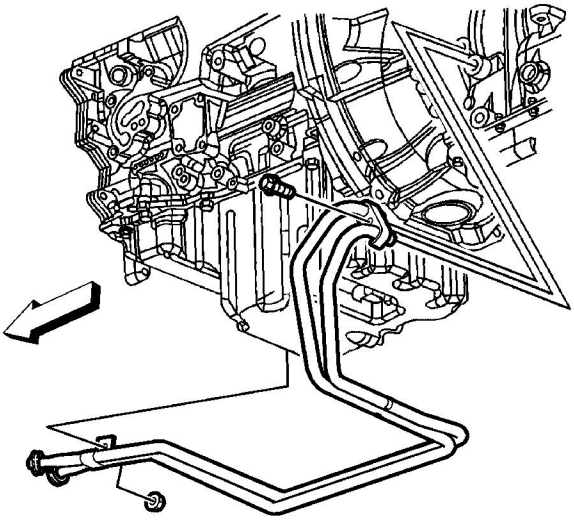
2. Connect the transmission fluid cooler pipes (1, 2) to the transmission fluid cooler using the following steps:
   2.1. Push the transmission fluid cooler pipes into the quick connect fitting, until an audible click is heard.
   2.2. Tug gently on the transmission cooler pipes to make sure the trans cooler pipes are fully connected.



3. Install NEW sealing washers over the transmission fluid cooler pipes.
4. Install the transmission fluid cooler pipes into the transmission.

Caution: Refer to Fastener Caution in the Preface section.

5. Install the transmission fluid cooler pipe retaining bolt and tighten to **25 N·m (18 lb. ft)**.

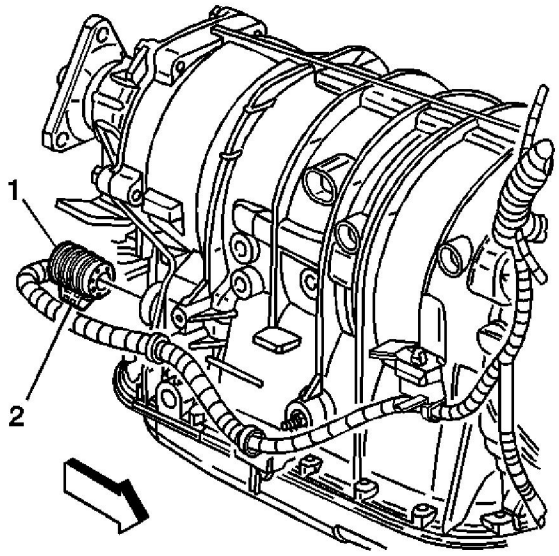


6. Install the transmission fluid cooler pipes bracket retaining bolt and tighten to **50 N·m (37 lb. ft)**.
7. Install the front air deflector. Refer to Front Air Deflector Replacement.
8. Lower the vehicle.
9. Inspect the transmission fluid level. Refer to Transmission Fluid Check.
10. Inspect for fluid leaks.

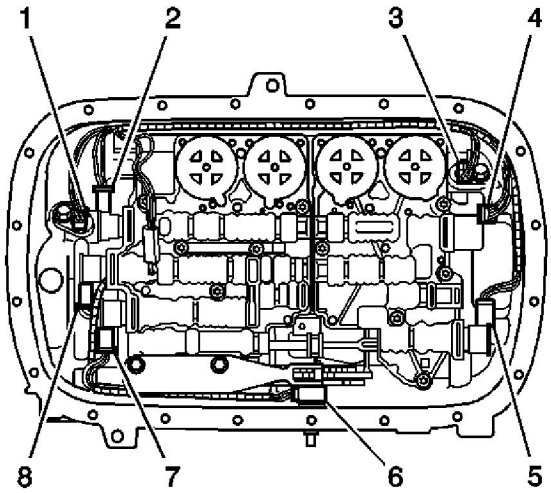
Transmission Internal Electrical Harness Replacement

Removal Procedure

1. Remove the Transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.

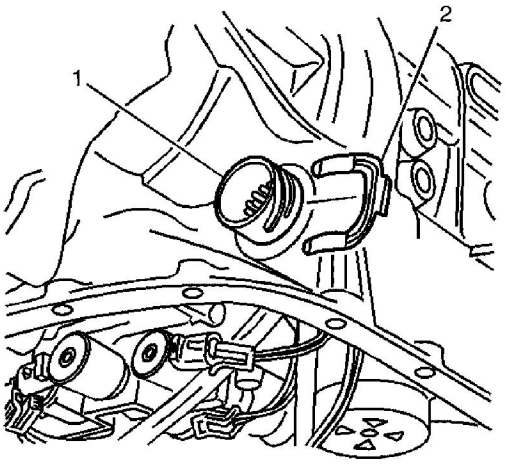


2. Disconnect the transmission wiring harness electrical connector (1) from the transmission by rotating the locking latch (2) counterclockwise.

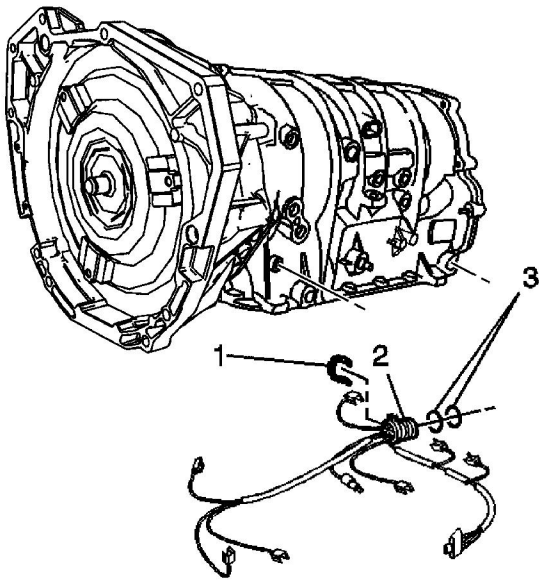


3. Disconnect the transmission internal wiring harness from components (1-8).

© 2010 General Motors Corporation. All rights reserved.

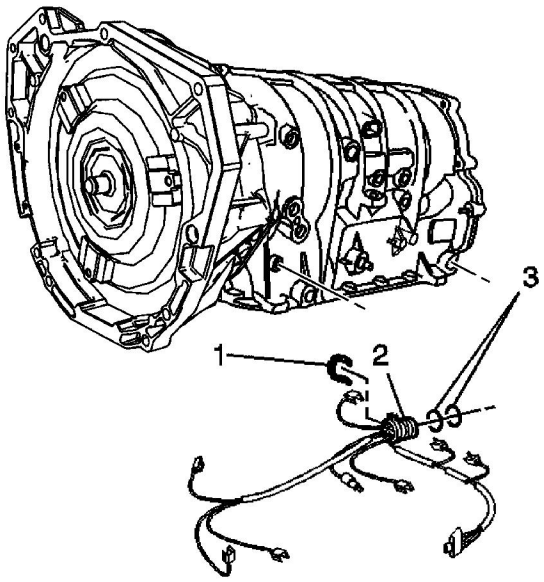


4. Remove the transmission internal wiring harness retainer (2) from the transmission internal wiring harness (1).

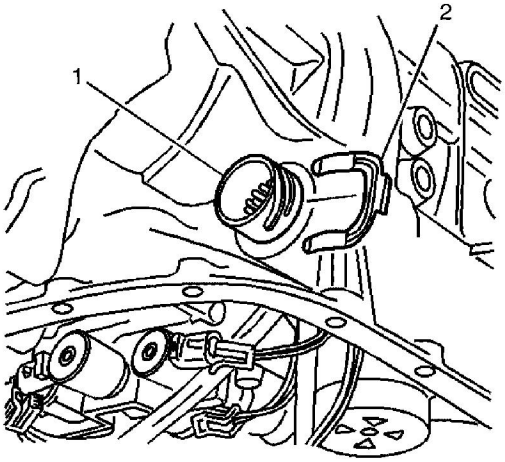


5. Remove the transmission internal wiring harness (2) from the transmission.
6. Remove the O-ring seals (3) from the internal wiring harness (2) only if the O-rings are cut or worn.

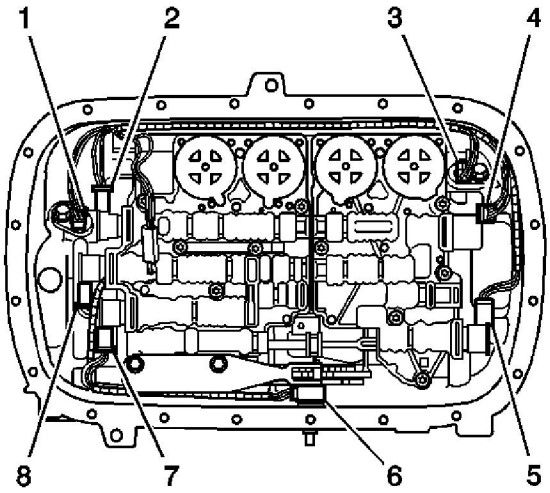
Installation Procedure



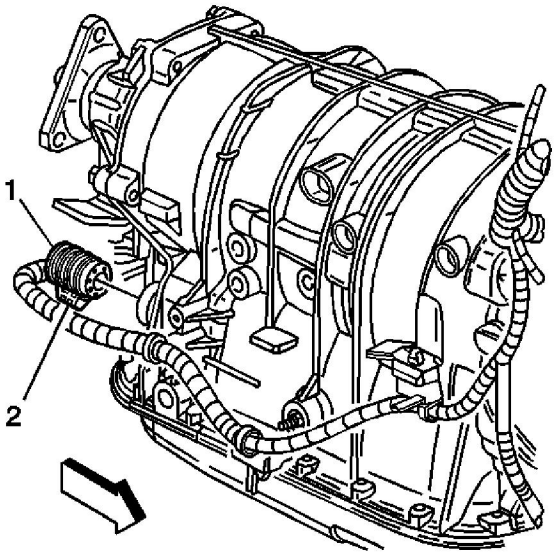
1. Install the internal wiring harness (2) to the transmission.



2. Install the transmission internal wiring harness retainer (2) to the internal wiring harness (1).



3. Connect the transmission internal wiring harness to components (1-8).



4. Connect the transmission wiring harness electrical connector (1) to the transmission by rotating the locking latch (2) clockwise.
5. Install the Transmission fluid pan and filter. Refer to Automatic Transmission Fluid and Filter Replacement.

Important: It is recommended that transmission adaptive pressure (TAP) information be reset.

Resetting the TAP values using a scan tool will erase all learned values in all cells. As a result, The ECM or TCM will need to relearn TAP values. Transmission performance may be affected as new TAP values are learned.

6. Reset the TAP values. Refer to Transmission Adaptive Functions.

Transmission Mount Inspection

Caution: In order to avoid oil pan damage and possible engine failure, insert a block of wood that spans the width of the oil pan bottom between the oil pan and the jack support.

1. Raise the transmission/transaxle in order to remove the weight from the transmission/transaxle mount and create slight tension in the rubber.
2. Observe the transmission/transaxle mount while raising the transmission/transaxle. Replace the transmission/transaxle mount if the transmission/transaxle mount exhibits any of the following conditions:

   Note: Black paint on the rubber will crack with time. This does no constitute a failure.

   - The hard rubber surface is covered with heat check cracks.
   - The rubber is separated from the metal plate of the transmission/transaxle mount.
   - The rubber is split through the center of the transmission/transaxle mount.
3. If there is movement between the metal plate of the transmission/transaxle mount and its attaching points, lower the transmission/transaxle on the transmission/transaxle mount. Tighten the retaining bolts or nuts attaching the transmission/transaxle mount to the frame or transmission/transaxle mount bracket.

© 2010 General Motors Corporation. All rights reserved.

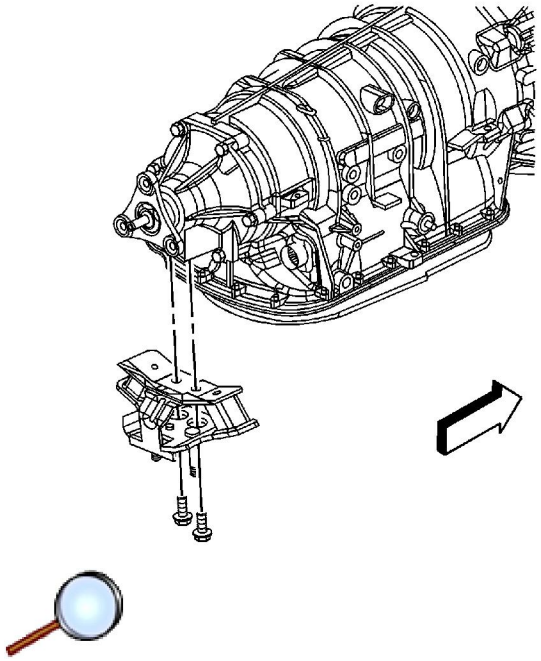
Transmission Rear Mount Replacement

Removal Procedure

1. Remove the exhaust system. Refer to Exhaust System Replacement.

   Note: The engine mounts must NOT bend or deflect from the vertical position. Damage to the mount will occur.

2. Support the transmission with a suitable jack and a block of wood.
3. Remove the transmission support. Refer to Transmission Support Replacement.



4. Remove the transmission mount retaining bolts.
5. Remove the transmission mount from the vehicle.

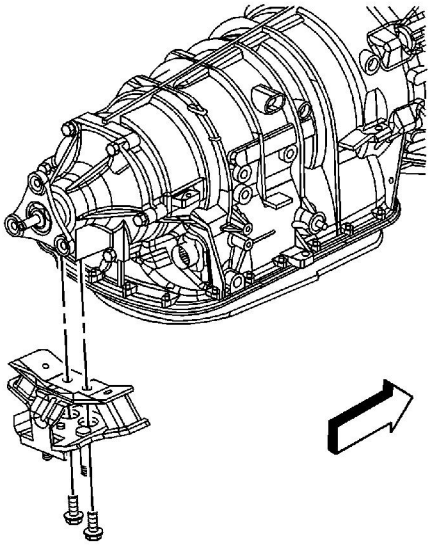
Installation Procedure

Note: The engine mounts must NOT bend or deflect from the vertical position. Damage to the mount will occur.

1. Install the transmission mount to the vehicle.

   Caution: Refer to Fastener Caution in the Preface section.

© 2010 General Motors Corporation. All rights reserved.



2. Install the transmission mount retaining bolts and tighten to **60 N·m (44 lb ft)**.
3. Install the transmission support. Refer to Transmission Support Replacement.
4. Remove the jack and block of wood.
5. Install the exhaust system.
6. Lower the vehicle.

Transmission Replacement

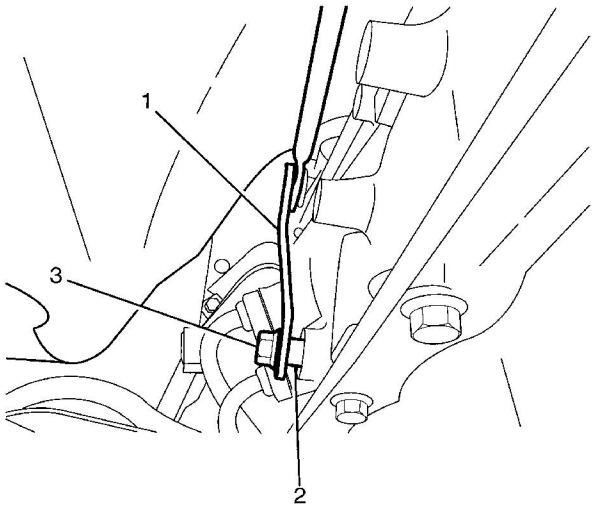
Special Tools

EN-48536 Frame Support Tool (Engine Lower 65 mm Kit)

Removal Procedure

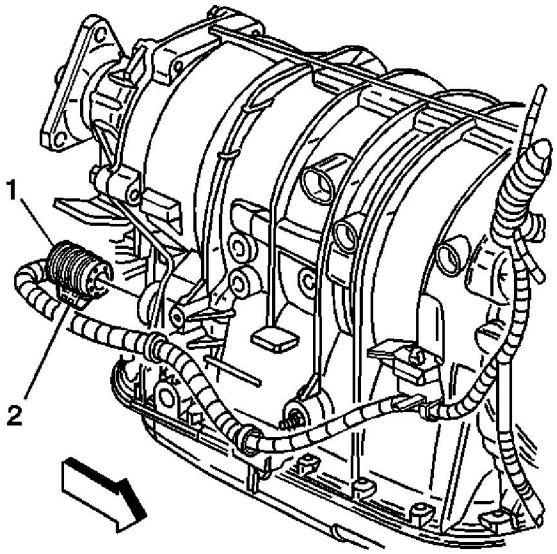
Note: NEW torque converter retaining bolts will be required each time the torque converter bolts are removed.

1. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection.
2. Remove engine air intake ducting.
3. Remove radiator retaining clips.
4. Disconnect the EVAP purge pipe.
5. Raise and suitably support the vehicle. Refer to Lifting and Jacking the Vehicle.
6. Remove the propeller shaft. Refer to Propeller Shaft Replacement.
7. Remove the air deflector front (1). Refer to Front Air Deflector Replacement.
8. Remove the splash shield.

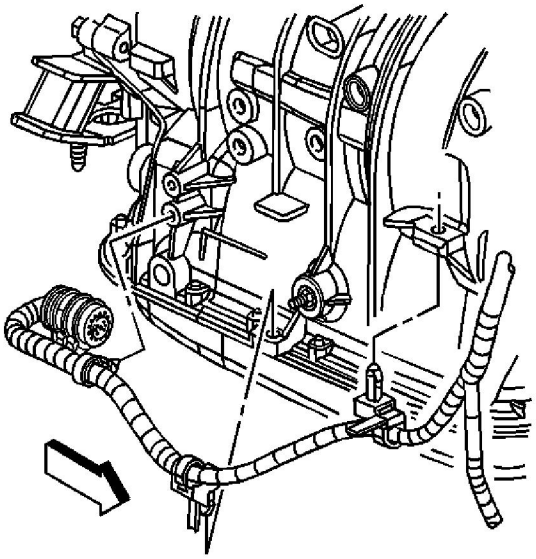


9. Remove the transmission manual shift shaft retaining nut (3).
10. Disconnect the shift linkage (1) from the transmission.

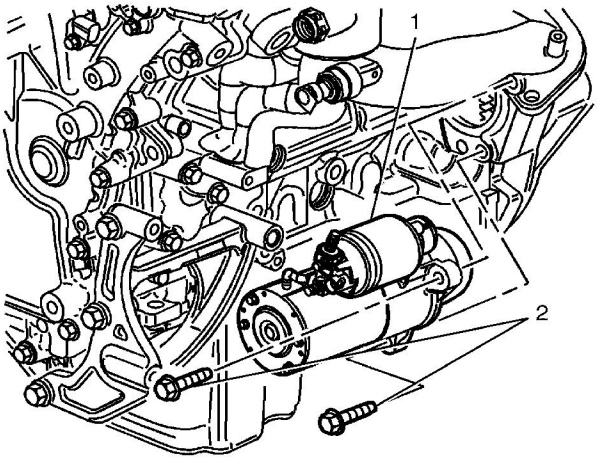
© 2010 General Motors Corporation. All rights reserved.



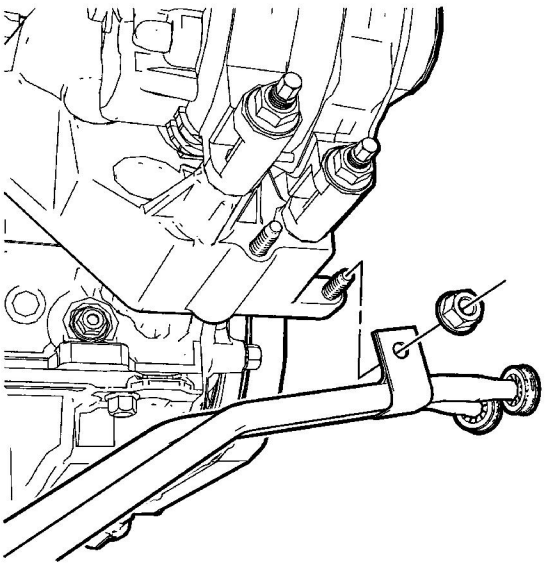
11. Disconnect the transmission wiring harness connector (1) from the transmission by rotating the locking latch (2) counterclockwise.



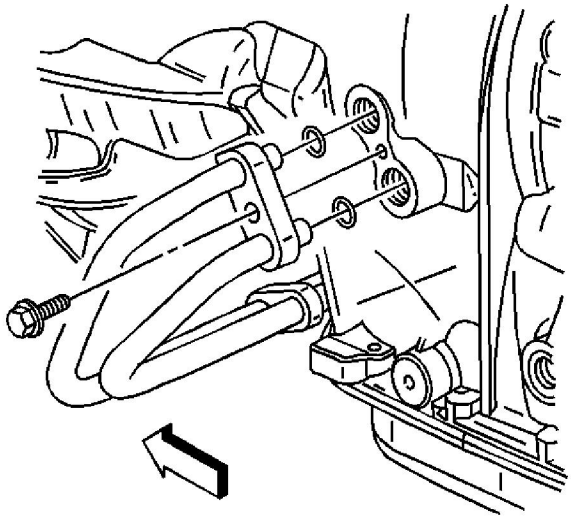
12. Disconnect the wiring harness clips from the transmission, and position the wiring harness aside.



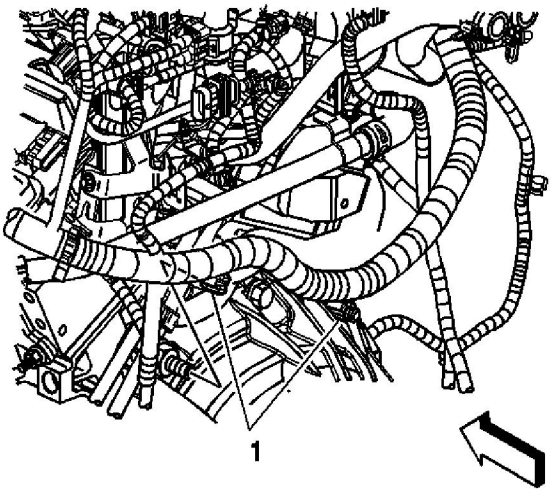
13. Remove the starter motor to gain access to the torque converter bolts. Refer to Starter Motor Replacement.
14. Mark the torque converter to flexplate/flywheel orientation to make sure proper realignment.
15. Repeat the following steps for all 3 torque converter bolts:
    15.1. Rotate the harmonic balancer centre bolt clockwise ONLY, in order to align the torque converter bolt with the starter motor opening in the engine block.
    15.2. Remove and discard the torque converter bolt. The bolt is self locking and is NOT reusable.
16. Using inspection hole push torque converter back towards transmission pump.
17. Place an oil drain pan under the transmission fluid cooler pipes.



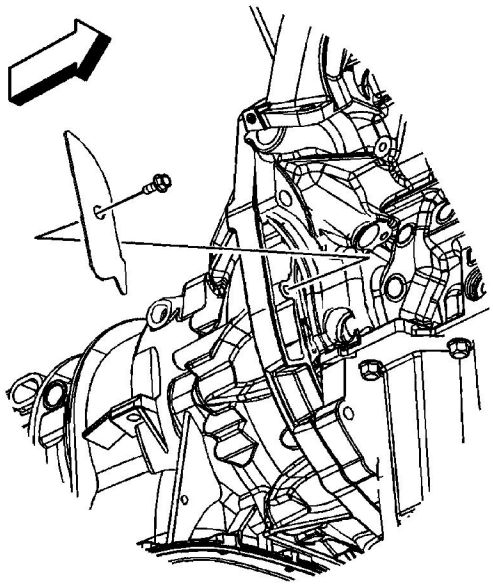
18. Remove the bolt securing the transmission fluid cooler pipes brace to the engine.



19. Disconnect the fluid cooler pipes from the transmission.
20. Plug the open outlet ports to prevent fluid loss and contamination.



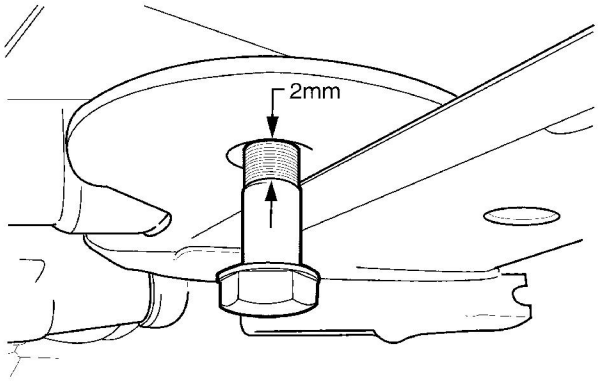
21. Disconnect the engine wiring harness retaining clips (1) to the transmission mounting bolts.
22. Disconnect the steering shaft from the steering rack.



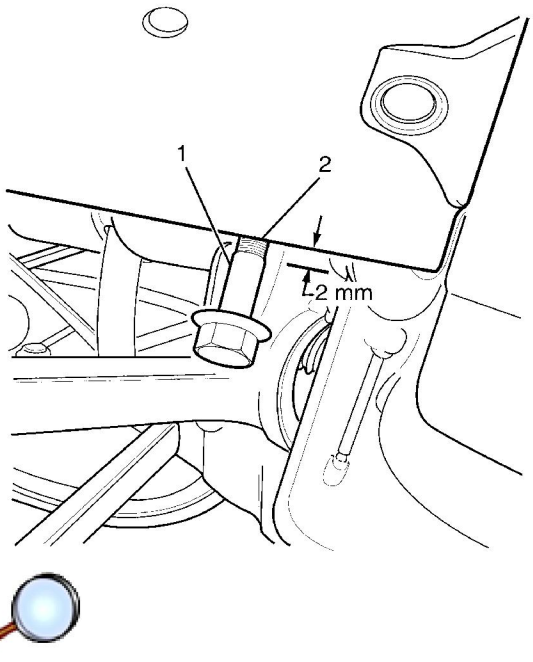
23. Remove the engine close out cover.

Note: The engine mounts must NOT bend or deflect from the vertical position. Damage to the mount will occur.

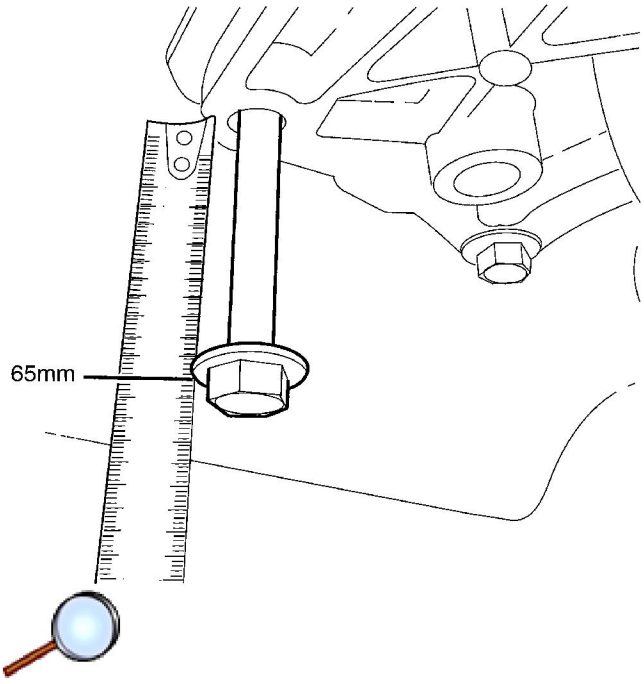
24. Support the power train with a suitable jack or table.



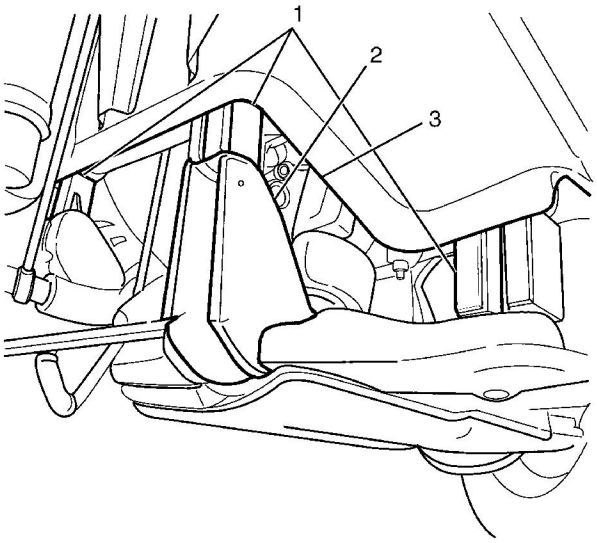
25. Remove the front sub-frame rear retaining bolts and fit bolts from special tool kit EN-48536.
26. Install bolt till stepped shank (1) is 2 mm below sub-frame (2).



27. Remove the front sub-frame front retaining bolts and fit bolts from special tool kit EN-48536.
28. Install bolt till stepped shank (1) is 2 mm below chassi rail flange (2).



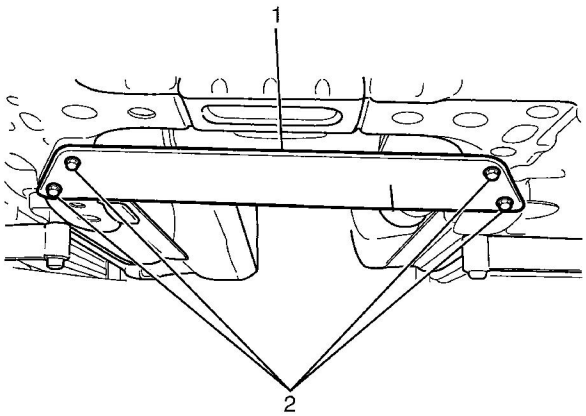
29. Remove all 4 transmission mount to body retaining bolts and install 2 bolts from special tool kit in diagonal holes e.g left hand front and right hand rear.
30. Install the bolts until 65 mm is measured between the bolt heads (1) and transmission mount (2).
31. Remove the front sub-frame middle bolts.
32. Lower the power train slowly until the sub-frame and transmission mount are resting on bolts.



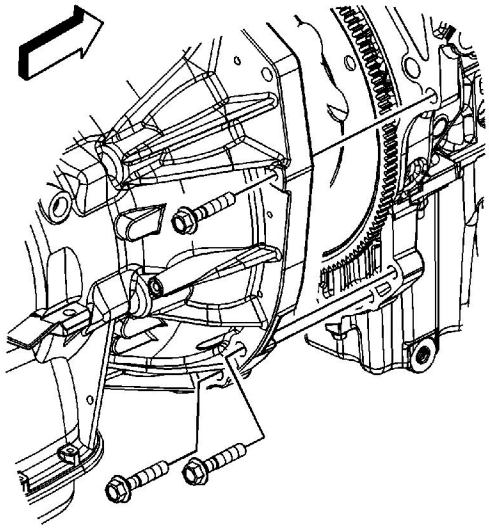
33. Insert the 65 mm spacer blocks (1) between the sub-frame (2) and chassis rails (3).

Caution: Refer to Fastener Caution in the Preface section.

34. Tension the front sub-frame front and rear bolts. Tighten the bolts to **95 N·m (70 lb ft)**
35. Install and tension the middle sub-frame bolts and tighten to **95 N·m (70 lb ft)**.
36. Remove the supporting jack or table



37. Install engine support plate (1) to the front sub-frame.
38. install the engine support plate retaining bolts (2) and tighten to **10 N·m (89 lb in)**.



39. Remove the transmission retaining bolts.
40. Pull the transmission free from the engine dowels.

Note: Ensure clearance is maintained between the transmission and the following:

- The catalytic converters
- The wiring harnesses
- The cooler pipes
- The propeller shaft

41. Carefully lower the transmission from the vehicle.
42. Flush the transmission oil cooler. Refer to Transmission Fluid Cooler Flushing and Flow Test.

Installation Procedure

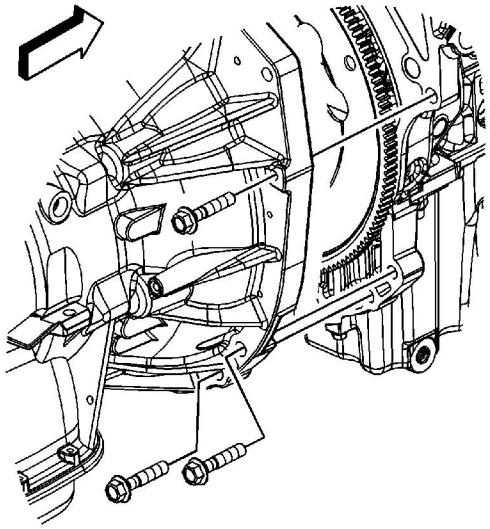
Note: The engine mounts must NOT bend or deflect from the vertical position. Damage to the mount will occur.

Note: Ensure clearance is maintained between the transmission and the following:

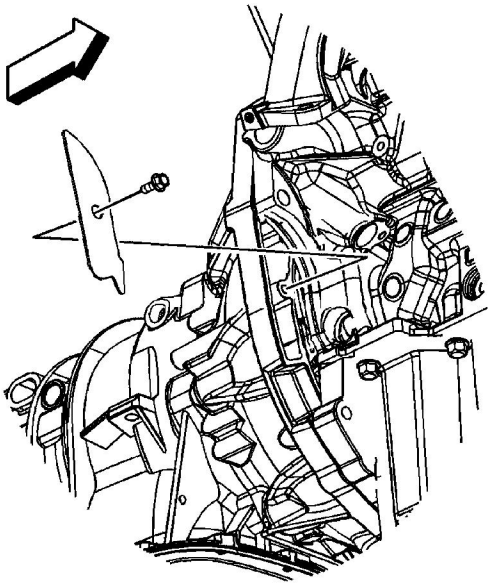
- The catalytic converters
- The wiring harnesses
- The cooler pipes
- The propeller shaft

1. Using the transmission jack, carefully raise the transmission to the vehicle.
2. Align the transmission with the engine dowels.

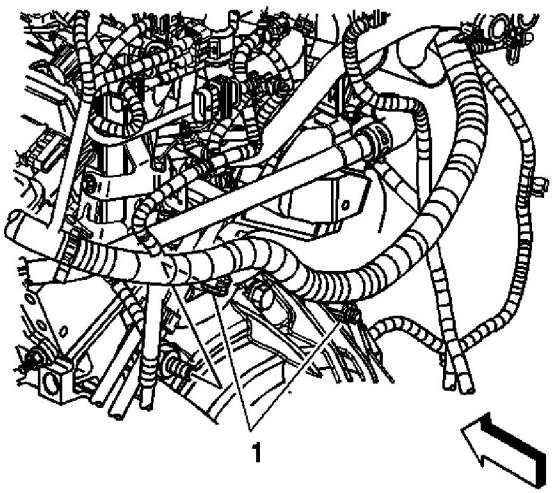
Caution: Refer to Fastener Caution in the Preface section.



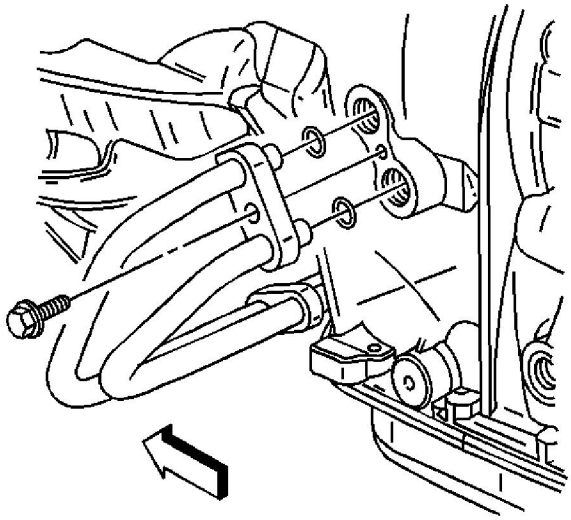
3. Install the right hand side transmission retaining bolts and tighten to **50 N·m (37 lb ft)**.
4. Install the remaining transmission retaining bolts.



5. Install the engine close out cover and tighten the studs to **10 N·m (89 lb in)**.
6. Remove the engine and transmission lowering blocks and engine balance plate.
7. Raise the powertrain back up into the engine bay and install the front sub-frame bolts. Tighten the bolts to **160 N·m (118 lb ft)** for the front 4 bolts and **240 N·m (177 lb ft)**.

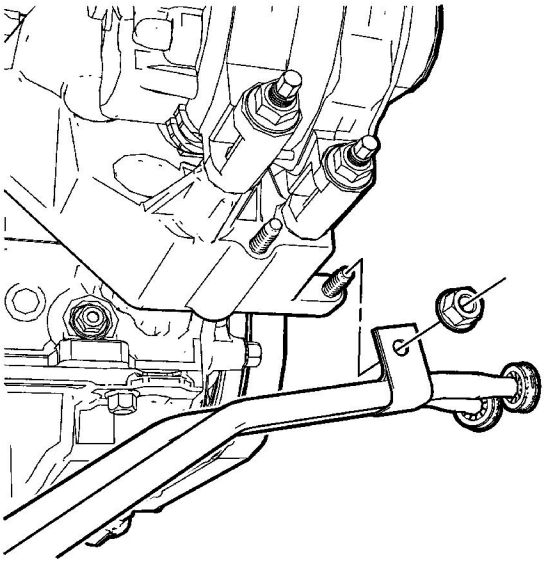


8. Connect the engine wiring harness retaining clips (1) to the transmission mounting bolts.
9. Install the steering shaft to the steering rack.

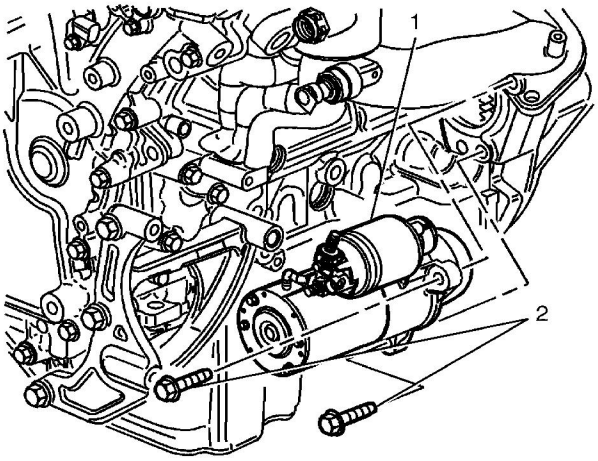


Note: Replace the O-rings seals if cracked, cut, or distorted.

10. Lubricate the O-rings seals with automatic transmission fluid.
11. Install the O-rings seals onto the cooler pipes prior to inserting the cooler pipes into the transmission.
12. Insert the transmission fluid cooler pipes into the transmission.
13. Install the bolt securing the transmission fluid cooler pipe retainer to the transmission and tighten to **25 N·m (18 lb ft)**.



14. Install the bolt securing the transmission fluid cooler pipes brace to the engine and tighten to **50 N·m (37 lb ft)**.



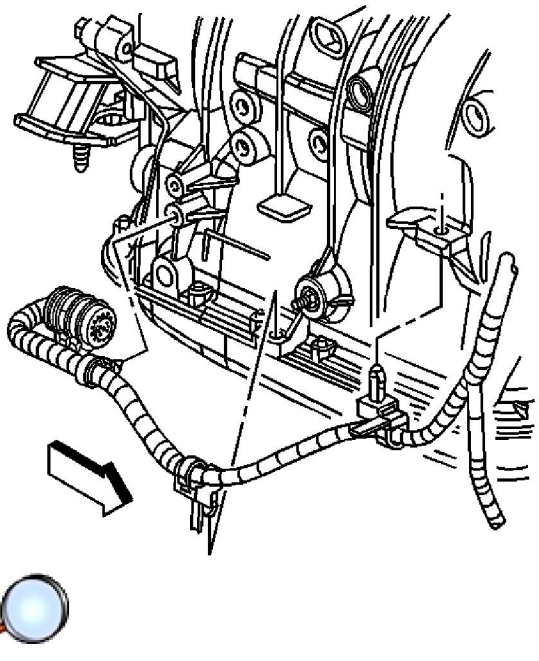
15. Align the torque converter to flexplate/flywheel orientation marks made during the removal procedure.

Note: Torque converter bolts are self locking and must be replaced with NEW torque converter bolts every time the bolts are removed.

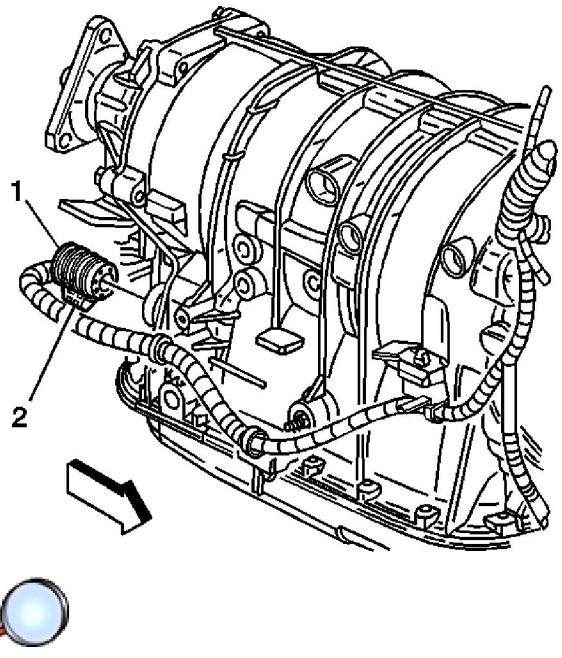
16. Repeat the following steps for all 3 torque converter bolts:
    16.1. Rotate the harmonic balancer center bolt clockwise ONLY, in order to align the torque converter bolt holes in the flexplate/flywheel with the starter motor opening in the engine block.
    16.2. To aid in alignment of the torque converter to the flexplate/flywheel, install all 3 NEW

torque converter retaining bolts before fully tightening. Tighten the bolts to **63 N·m (46 lb ft)**.

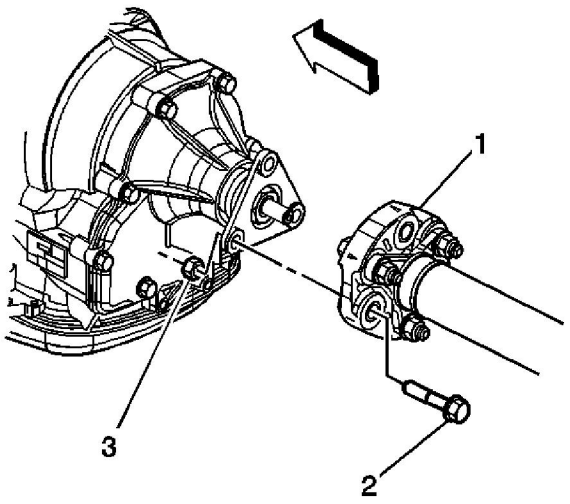
17. Install the starter motor. Refer to Starter Motor Replacement.
18. Install the air deflector front (1). Refer to Front Air Deflector Replacement.



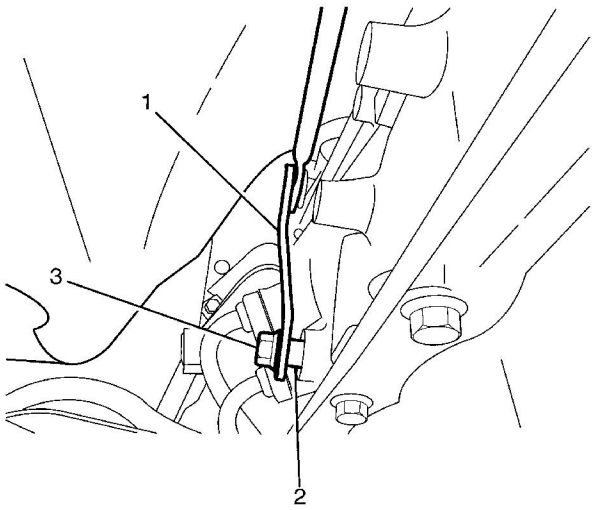
19. Connect the wiring harness clips to the transmission.



20. Connect the transmission wiring harness connector (1) to the transmission by rotating the locking latch (2) clockwise.



21. Install the propeller shaft coupler (1) to the transmission flange. Refer to Propeller Shaft Replacement.



22. Place the transmission in the park position by rotating the shift shaft (2) fully counterclockwise.
23. Connect the shift linkage (1) to the transmission.
24. Install the transmission manual shift shaft retaining nut (3) and tighten to **15 N·m (11 lb ft)**.
25. Check the transmission fluid level (fill if necessary). Refer to Transmission Fluid Check.
26. Adjust the shift control linkage. Refer to Shift Control Linkage Adjustment.
27. Lower the vehicle.
28. Connect the EVAP purge pipe.
29. Install radiator retaining clips.
30. Install air intake ducting from engine.
31. Connect the negative battery cable. Refer to Battery Negative Cable Disconnection and

Connection.

32. The transmission control module must be programmed with the proper software/calibrations. Refer to Control Module References.

Transmission Final Test and Inspection

Complete the following procedure after the transmission is installed in the vehicle:

1. With the ignition OFF or disconnected, turn the engine by hand several times. Listen for any unusual noises or evidence that any parts are binding.
2. Start the engine and listen for abnormal sounds.
3. While the engine continues to idle, raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.
4. Inspect for fluid leaks while the engine is idling.
5. Lower the vehicle.
6. Perform a final inspection for the proper fluid level.
7. Road test the vehicle.